

ASSALAM O ALAIKUM  
All Dearz fellows  
ALL IN ONE MTH301  
Final term PAPERS & MCQz  
Created BY Farhan & Ali  
BS (cs) 2nd sem  
Hackers Group  
From Mandi Bahauddin  
Remember us in your prayers

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**FINALTERM EXAMINATION**

Spring 2010  
MTH301- Calculus II

Time: 90 min  
Marks: 60

Student Info	
Student ID:	
Center:	
Exam Date:	

**For Teacher's Use Only**



**Question No: 1 ( Marks: 1 ) - Please choose one**

---

Intersection of two straight lines is -----

- ▶ Surface
- ▶ Curve
- ▶ Plane
- ▶ **Point**

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

Plane is a ----- surface.

- ▶ One-dimensional
- ▶ **Two-dimensional**
- ▶ Three-dimensional
- ▶ Dimensionless

**Question No: 3 ( Marks: 1 ) - Please choose one**

---

Let  $w = f(x, y, z)$  and  $x = g(r, s)$ ,  $y = h(r, s)$ ,  $z = t(r, s)$  then by chain rule

$$\frac{\partial w}{\partial r} =$$

- ▶  $\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$
- ▶  $\frac{\partial w}{\partial r} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial z}{\partial r}$
- ▶  $\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} \frac{\partial x}{\partial s} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} \frac{\partial y}{\partial s} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r} \frac{\partial z}{\partial s}$
- ▶  $\frac{\partial w}{\partial r} \frac{\partial r}{\partial x} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial y} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial z}$

**Question No: 4 ( Marks: 1 ) - Please choose one**

---

What are the parametric equations that correspond to the following vector equation?

$$\vec{r}(t) = \sin^2 t \hat{i} + (1 - \cos 2t) \hat{j}$$

- ▶  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 0$
- ▶  $y = \sin^2 t$  ,  $x = 1 - \cos 2t$  ,  $z = 0$

▶  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 1$

▶  $x = \sin^2 t$  ,  $y = \cos 2t$  ,  $z = 1$

**Question No: 5 ( Marks: 1 ) - Please choose one**

---

**What are the parametric equations that correspond to the following vector equation?**

$$\vec{r}(t) = (2t - 1)\hat{i} - 3\sqrt{t}\hat{j} + \sin 3t\hat{k}$$

▶  $z = 2t - 1$  ,  $x = -3\sqrt{t}$  ,  $y = \sin 3t$

▶  $y = 2t - 1$  ,  $x = -3\sqrt{t}$  ,  $z = \sin 3t$

▶  $x = 2t - 1$  ,  $z = -3\sqrt{t}$  ,  $y = \sin 3t$

▶  $x = 2t - 1$  ,  $y = -3\sqrt{t}$  ,  $z = \sin 3t$

**Question No: 6 ( Marks: 1 ) - Please choose one**

---

**What is the derivative of following vector-valued function?**

$$\vec{r}(t) = (\cos 5t, \tan t, 6 \sin t)$$

▶  $\vec{r}'(t) = \left( \frac{\sin 5t}{5}, \sec t, 6 \cos t \right)$

▶  $\vec{r}'(t) = \left( \frac{-\sin 5t}{5}, \sec t, 6 \cos t \right)$

▶  $\vec{r}'(t) = (-5 \sin 5t, \sec^2 t, 6 \cos t)$

▶  $\vec{r}'(t) = (\sin 5t, \sec^2 t, -6 \cos t)$

**Question No: 7 ( Marks: 1 ) - Please choose one**

---

**What is the derivative of following vector-valued function?**

$$\vec{r}(t) = \left( t^4, \sqrt{t+1}, \frac{3}{t^2} \right)$$

▶  $\vec{r}'(t) = \left( 4t^3, \frac{1}{\sqrt{t+1}}, \frac{-6}{t^3} \right)$

▶  $\vec{r}'(t) = \left( 4t^3, \frac{1}{2\sqrt{t+1}}, \frac{6}{t^3} \right)$

▶  $\vec{r}'(t) = \left( 4t^4, \frac{1}{2\sqrt{t+1}}, \frac{-6}{t^3} \right)$

▶  $\vec{r}'(t) = \left( 4t^3, \frac{1}{2\sqrt{t+1}}, \frac{-6}{t^3} \right)$

**Question No: 8 ( Marks: 1 ) - Please choose one**

---

**The following differential is exact**

$$dz = (x^2y + y) dx - x dy$$


▶ True

▶ False

**Question No: 9 ( Marks: 1 ) - Please choose one**

---

Which one of the following is correct Wallis Sine formula when  $n$  is even and  $n \geq 2$ ?

  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{5}{6} \frac{3}{4} \frac{1}{2}$  page #182

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{6}{7} \frac{4}{5} \frac{2}{3}$

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

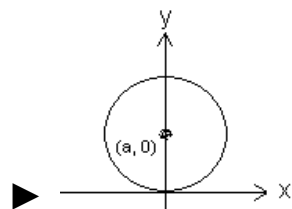
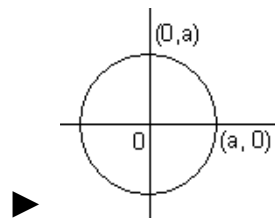
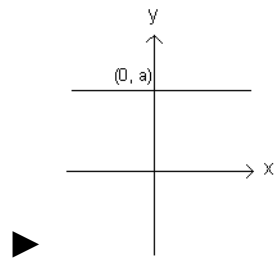
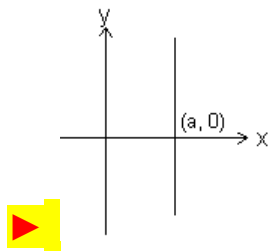
**Question No: 10 ( Marks: 1 ) - Please choose one**

---

Match the following equation in polar co-ordinates with its graph.

$$r \cos \theta = a$$

where  $a$  is an arbitrary constant



**Question No: 11 ( Marks: 1 ) - Please choose one**

---

**If the equation of a curve, in polar co-ordinates, remains unchanged after replacing  $(r, \theta)$  by  $(r, \pi - \theta)$  then the curve is said to be symmetric about which of the following?**



▶ Initial line

▶ **Y-axis**

▶ Pole

**Question No: 12 ( Marks: 1 ) - Please choose one**

---

**If the equation of a curve, in polar co-ordinates, remains unchanged after replacing  $(r, \theta)$  by  $(-r, \theta)$  then the curve is said to be symmetric about which of the following?**

▶ Initial line

▶ y-axis

▶ **Pole**

**Question No: 13 ( Marks: 1 ) - Please choose one**

---

**What is the amplitude of a periodic function defined by**

$$f(x) = \sin \frac{x}{3} ?$$

▶ **0**

▶ 1

▶  $\frac{1}{3}$

▶ Does not exist

**Question No: 14 ( Marks: 1 ) - Please choose one**

---

**What is the period of a periodic function defined by**  
 $f(x) = 4 \cos 3x$  ?

▶  $\frac{\pi}{4}$

▶  $\frac{\pi}{3}$

▶  $\frac{2\pi}{3}$

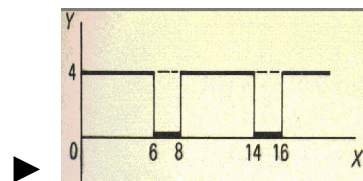
▶  $\pi$

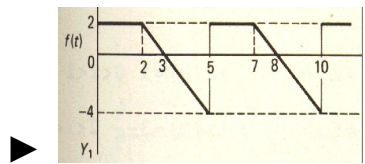
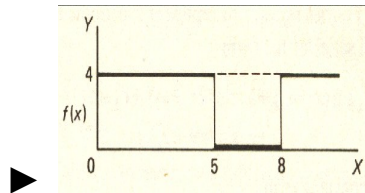
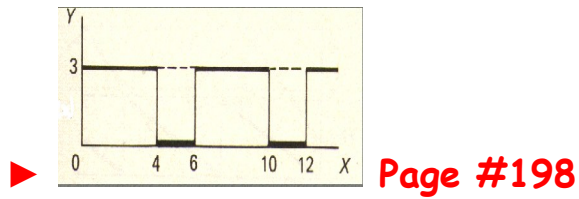
**Question No: 15 ( Marks: 1 ) - Please choose one**

---

**Match the following periodic function with its graph.**

$$f(x) = \begin{cases} 3 & 0 < x < 4 \\ 0 & 4 < x < 6 \end{cases}$$

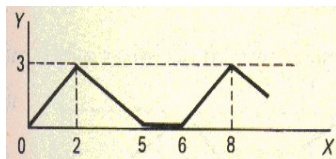




**Question No: 16 ( Marks: 1 ) - Please choose one**

---

**What is the period of periodic function whose graph is as below?**



▶ 2

▶ 5

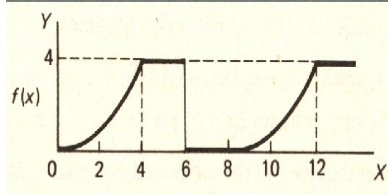
▶ **6**

▶ 8

**Question No: 17 ( Marks: 1 ) - Please choose one**

---

What is the period of periodic function whose graph is as below?



▶ 0

▶ 4

▶ 6

▶ **8**

**Question No: 18 ( Marks: 1 ) - Please choose one**

---

Let  $L$  denotes the Laplace Transform.

If  $L\{F(t)\} = f(s)$  where  $s$  is a constant and  $\lim_{t \rightarrow 0} \left( \frac{F(t)}{t} \right)$  exists then which of the following equation holds?

▶  $L\left(\frac{F(t)}{t}\right) = f(s+a)$

▶  $L\left(\frac{F(t)}{t}\right) = f(s-a)$

$L\left(\frac{F(t)}{t}\right) = \int_s^\infty f(s) ds$

▶  $L\left(\frac{F(t)}{t}\right) = -\frac{d}{ds}\{f(s)\}$

**Question No: 19 ( Marks: 1 ) - Please choose one**

---

Which of the following is Laplace inverse transform of the function  $f(s)$  defined by  $f(s) = \frac{3}{s-2} - \frac{2}{s}$ ?

▶  $3te^{2t} - 2$

▶  $3e^{2t} - 2t$

$3e^{2t} - 2$

▶ None of these.

**Question No: 20 ( Marks: 1 ) - Please choose one**

---

Let  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$  be any two points in three dimensional space. What does the formula  $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$  calculates?

▶ Distance between these two points

▶ Midpoint of the line joining these two points

▶ Ratio between these two points

**Question No: 21 ( Marks: 1 ) - Please choose one**

---

Let the functions  $P(x, y)$  and  $Q(x, y)$  are finite and continuous inside and at the boundary of a closed curve  $C$  in the  $xy$ -plane. If  $(P dx + Q dy)$  is an exact differential then

$$\oint_C (P dx + Q dy) =$$

▶ Zero

▶ One

▶ Infinite

**Question No: 22 ( Marks: 1 ) - Please choose one**

---

What is Laplace transform of the function  $F(t)$  if  $F(t) = t$  ?

▶  $L\{t\} = \frac{1}{s}$

▶  $L\{t\} = \frac{1}{s^2}$

▶  $L\{t\} = e^{-s}$

▶  $L\{t\} = s$

**Question No: 23 ( Marks: 1 ) - Please choose one**

---

What is the value of  $L\{e^{5t}\}$  if  $L$  denotes laplace transform?

▶  $L\{e^{5t}\} = \frac{1}{s-5}$

▶  $L\{e^{5t}\} = \frac{s}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5!}{s^6}$

**Question No: 24 ( Marks: 1 ) - Please choose one**

---

Evaluate the line integral  $\int_C (3x+2y) dx + (2x-y) dy$  where  $C$  is

the line segment from  $(0, 0)$  to  $(0, 2)$ .

▶ 1

▶ 0

▶ 2

▶ -2

**Question No: 25 ( Marks: 1 ) - Please choose one**

---

Evaluate the line integral  $\int_C (2x+y) dx + (x^2-y) dy$  where  $C$  is the line segment from  $(0, 0)$  to  $(2, 0)$ .

▶ 0

▶ -4

▶ 4

▶ Do not exist

**Question No: 26 ( Marks: 1 ) - Please choose one**

---

Which of the following are direction ratios for the line joining the points  $(1, 3, 5)$  and  $(2, -1, 4)$ ?

▶ 3, 2 and 9



▶ 1, -4 and -1

▶ 2, -3 and 20

▶ 0.5, -3 and 5/4

**Question No: 27 ( Marks: 1 ) - Please choose one**

---

If  $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } 1 \leq y \leq 4\}$ , then

$$\iint_R (6x^2 + 4xy^3) dA =$$

▶  $\int_1^4 \int_0^2 (6x^2 + 4xy^3) dy dx$

▶  $\int_0^2 \int_1^4 (6x^2 + 4xy^3) dx dy$

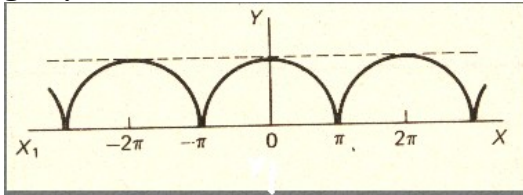
▶  $\int_1^4 \int_0^2 (6x^2 + 4xy^3) dx dy$

▶  $\int_2^4 \int_0^1 (6x^2 + 4xy^3) dx dy$

Question No: 28 ( Marks: 1 ) - Please choose one

---

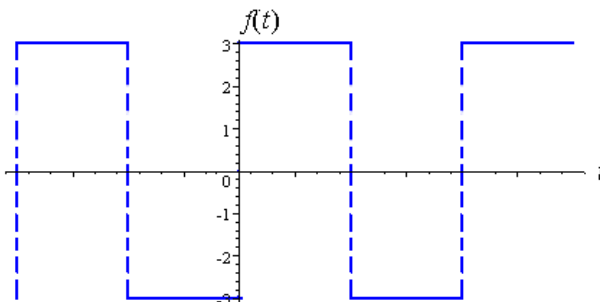
Which of the following is true for a periodic function whose graph is as below?



- ▶ **Even function**
- ▶ Odd function
- ▶ Neither even nor odd function

Question No: 29 ( Marks: 1 ) - Please choose one

---



Which of the following is true for a function whose graph is given above.

- ▶ **An odd function**

- ▶ An even function
  
- ▶ Neither even nor odd

**Question No: 30      ( Marks: 1 ) - Please choose one**

---

At each point of domain, the function -----

- ▶ **Is defined**
  
- ▶ Is continuous
  
- ▶ Is infinite
  
- ▶ Has a limit

**Question No: 31      ( Marks: 2 )**

---

Determine whether the following differential is exact or not.

$$dz = 4x^3y^3 dx + 3x^4y^2 dy$$

**Solution:**

$$dz = 4x^3y^3 dx + 3x^4y^2 dy$$

$$\frac{\partial p}{\partial y} = 12x^3y^2$$

$$\frac{\partial Q}{\partial X} = 12x^3y^2$$

$$\frac{\partial p}{\partial y} = \frac{\partial Q}{\partial X}$$

yes

**Question No: 32 ( Marks: 2 )**

---

**Evaluate**

$$\int_{-\pi}^{\pi} \sin nx dx$$

where n is an integer other than zero.

**Solution:**

$$\begin{aligned} & \int_{-\pi}^{\pi} \sin nx dx \\ &= \left[ \frac{-\cos nx}{n} \right]_{-\pi}^{\pi} \\ &= \left[ \frac{-\cos n\pi}{n} + \frac{\cos n\pi}{n} \right] \\ &= \frac{1}{n} (-\cos n\pi + \cos n\pi) \\ &= 0 \end{aligned}$$

**Question No: 33 ( Marks: 2 )**

---

Find Laplace transform of the function  $F(t)$  if  $F(t) = e^{3t}$

**Solution:**

$$\begin{aligned}
L(e^{3t}) &= \int_0^{\infty} e^{3t} - e^{-st} \\
&= \int_0^{\infty} e^{-(s-3)t} .dt \\
&= \left\{ \frac{e^{-(s-3)t}}{-(s-3)} \right\} \lim_{0 \rightarrow \infty} \\
&= \frac{-1}{s-3} \left( \frac{1}{e^{(s-3)t}} \right) \\
&= \frac{-1}{s-3} (0-1) \\
&= \frac{1}{s-3} \dots \text{Ans}
\end{aligned}$$

**Question No: 34 ( Marks: 3 )**

---

Determine the Fourier co-efficient  $a_0$  of the periodic function defined below:

$$f(x) = 2x + 1 \quad 0 < x < 2$$

**Solution:**

$$a_0 = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) dx$$

$$f(x) = (2x + 1)$$

$$(0, 2)$$

$$= \int_0^2 (2x + 1) dx$$

$$= [x^2 + x]_0^2$$

$$= 6$$

**Question No: 35 ( Marks: 3 )**

---

Determine whether the following differential is exact or not.

$$dz = (3x^2e^{2y} - 2y^2e^{3x}) dx + (2x^3e^{2y} - 2ye^{3x}) dy$$

**Solution:**

$$dz = Pdx + Qdy$$

Therefore,

For dz to be an exact differential it must satisfy  $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$

But this test fails because  $\frac{\partial P}{\partial y} \neq \frac{\partial Q}{\partial x}$

Not Exact

**Question No: 36 ( Marks: 3 )**

---

Use Wallis sine formula to evaluate  $\int_0^{\frac{\pi}{2}} (\sin^3 x + \sin^5 x) dx$

**Solution:**

$$\int_0^{\frac{\pi}{2}} \sin^3 x dx$$

$$= \frac{n-1}{n}$$

$$= \frac{3-1}{3}$$

$$= \frac{2}{3}$$

$$\int_0^{\frac{\pi}{2}} \sin^5 x dx$$

$$= \frac{n-1}{n} \cdot \frac{n-3}{n-2}$$

$$= \frac{5-1}{5} \cdot \frac{5-3}{5-2}$$

$$= \frac{4}{5} \cdot \frac{2}{3}$$

$$\int_0^{\frac{\pi}{2}} (\sin^3 x + \sin^5 x) dx$$

$$= \frac{2}{3} + \frac{4}{5} \cdot \frac{2}{3}$$

**Question No: 37 ( Marks: 5 )**

---

Evaluate the following line integral which is independent of path.

$$\int_{(0,0)}^{(3,2)} (2xe^y) dx + (x^2e^y) dy$$

**Solution:**

$$p = \frac{\partial z}{\partial x} = 2e^y \quad \int 2e^y dx$$

$$Q = \frac{\partial z}{\partial y} = x^2 e^y \quad \int x^2 e^y dy$$

$$z = \int_{(0,0)}^{(3,2)} 2xe^y + x^2 ye^y$$

$$z = 6e^2 + 18e^2$$

$$z = 24e^2$$

**Question No: 38 ( Marks: 5 )**

---

Determine the Fourier coefficients  $b_n$  for a periodic function  $f(t)$  of period 2 defined by

$$f(t) = \begin{cases} 4(1+t) & -1 < t < 0 \\ 0 & 0 < t < 1 \end{cases}$$

**Solution:**

$$b_n = \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin nxdx$$

$$= \frac{1}{\pi} \int_{-1}^1 4(1+t) \sin nxdx$$

$$= \frac{1}{\pi} \left[ \frac{-4(1+t) \cos nx}{n} \right]_{-1}^1$$

$$= \frac{-4(1+t)}{\pi n} [\cos n(1) - \cos n(-1)]$$

$$= \frac{-4(1+t)}{\pi n} (\cos n + \cos n)$$

**Question No: 39 ( Marks: 5 )**

---

Determine whether the following vector field  $\vec{F}$  is conservative or not.

$$\vec{F}(x, y, z) = (4x - z)\hat{i} + (3y + z)\hat{j} + (y - x)\hat{k}$$

.....



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**FINALTERM EXAMINATION**  
**Spring 2010**  
**MTH301- Calculus II (Session - 2)**

**Time: 90 min**  
**Marks: 60**

Student Info	
StudentID:	\$\$
Center:	OPKST
ExamDate:	19 Aug 2010



**Question No: 1 ( Marks: 1 ) - Please choose one**

---

----- planes intersect at right angle to form three dimensional space.

- ▶ **Three**
- ▶ Four
- ▶ Eight
- ▶ Twelve

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

If the positive direction of x, y axes are known then ----- the positive direction of z-axis.

- ▶ Horizontal rightward direction is
- ▶ Vertical upward direction is
- ▶ **Left hand rule tells**
- ▶ Right hand rule tells

**Question No: 3 ( Marks: 1 ) - Please choose one**

---

What is the distance between points (3, 2, 4) and (6, 10, -1)?

- ▶  **$7\sqrt{2}$**
- ▶  $2\sqrt{6}$
- ▶  $\sqrt{34}$
- ▶  $7\sqrt{3}$

**Question No: 4 ( Marks: 1 ) - Please choose one**

---

The equation  $ax+by+cz+d=0$ , where  $a,b,c,d$  are real numbers, is the general equation of which of the following?

- ▶ **Plane**
- ▶ Line
- ▶ Curve
- ▶ Circle

---

**Question No: 5 ( Marks: 1 ) - Please choose one**

---

The spherical co-ordinates of a point are  $\left(\sqrt{3}, \frac{\pi}{3}, \frac{\pi}{2}\right)$ . What are its cylindrical co-ordinates?

- ▶  $\left(\frac{\sqrt{3}}{2}, \frac{3}{2}, 0\right)$
- ▶  $\left(\sqrt{3} \cos \frac{\pi}{3}, \sqrt{3} \sin \frac{\pi}{3}, 0\right)$
- ▶  $\left(\sqrt{3} \sin \frac{\pi}{3}, \frac{\pi}{2}, \sqrt{3} \cos \frac{\pi}{3}\right)$
- ▶  $\left(\sqrt{3}, \frac{\pi}{3}, 0\right)$

---

**Question No: 6 ( Marks: 1 ) - Please choose one**

---

Domain of the function  $f(x, y) = \sqrt{y-x^2}$  is

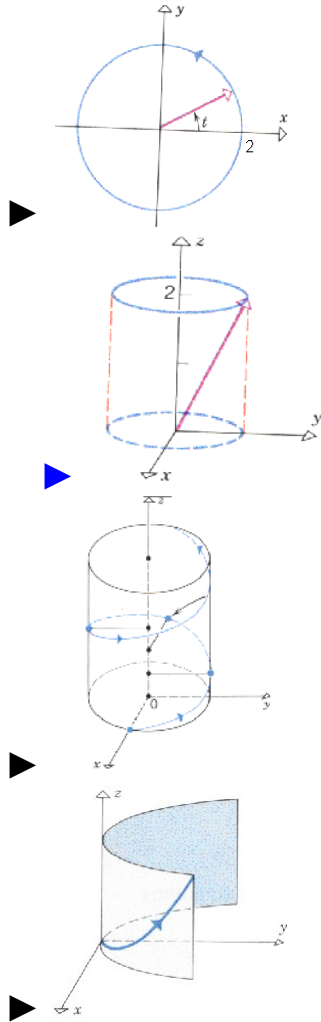
- ▶  $y < x^2$
- ▶  $y \geq x^2$
- ▶  $y \neq x^2$
- ▶ Entire space

---

**Question No: 7 ( Marks: 1 ) - Please choose one**

Match the following vector-valued function with its graph.

$$\vec{r}(t) = \cos t \hat{i} + \sin t \hat{j} + 2\hat{k} \quad \text{and} \quad 0 \leq t \leq 2\pi$$



**Question No: 8 ( Marks: 1 ) - Please choose one**

What are the parametric equations that correspond to the following vector equation?

$$\vec{r}(t) = \sin^2 t \hat{i} + (1 - \cos 2t) \hat{j}$$

- ▶  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 0$
- ▶  $y = \sin^2 t$  ,  $x = 1 - \cos 2t$  ,  $z = 0$

- ▶  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 1$
- ▶  $x = \sin^2 t$  ,  $y = \cos 2t$  ,  $z = 1$

**Question No: 9 ( Marks: 1 ) - Please choose one**

---

What are the parametric equations that correspond to the following vector equation?

$$r(t) = (2t-1)\hat{i} - 3\sqrt{t}\hat{j} + \sin 3t\hat{k}$$

- ▶  $z = 2t-1$  ,  $x = -3\sqrt{t}$  ,  $y = \sin 3t$
- ▶  $y = 2t-1$  ,  $x = -3\sqrt{t}$  ,  $z = \sin 3t$
- ▶  $x = 2t-1$  ,  $z = -3\sqrt{t}$  ,  $y = \sin 3t$
- ▶  $x = 2t-1$  ,  $y = -3\sqrt{t}$  ,  $z = \sin 3t$

**Question No: 10 ( Marks: 1 ) - Please choose one**

---

Is the following vector-valued function  $\vec{r}(t)$  continuous at  $t=1$ ? If not, why?

$$\vec{r}(t) = \left( \frac{t+1}{t-1}, t^2, 2t \right)$$

- ▶  $\vec{r}(t)$  is continuous at  $t=1$
- ▶  $\vec{r}(1)$  is not defined
- ▶  $\vec{r}(1)$  is defined but  $\lim_{t \rightarrow 1} \vec{r}(t)$  does not exist
- ▶  $\vec{r}(1)$  is defined and  $\lim_{t \rightarrow 1} \vec{r}(t)$  exists but these two numbers are not equal.

**Question No: 11 ( Marks: 1 ) - Please choose one**

---

Which one of the following is correct Wallis Sine formula when  $n$  is even and  $n \geq 2$ ?

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{5}{6} \frac{3}{4} \frac{1}{2}$$

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{6}{7} \frac{4}{5} \frac{2}{3}$$

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$$

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$$

**Question No: 12 ( Marks: 1 ) - Please choose one**

Which one of the following is correct Wallis Cosine formula when  $n$  is odd and  $n \geq 3$ ?

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \cos^n x \, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{5}{6} \frac{3}{4} \frac{1}{2}$$

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \cos^n x \, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$$

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \cos^n x \, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$$

$$\blacktriangleright \int_0^{\frac{\pi}{2}} \cos^n x \, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{6}{7} \frac{4}{5} \frac{2}{3}$$

**Question No: 13 ( Marks: 1 ) - Please choose one**

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing  $(r, \theta)$  by  $(r, \pi - \theta)$  then the curve is said to be symmetric about which of the following?

▶ Initial line

▶ **y-axis**

▶ Pole

**Question No: 14 ( Marks: 1 ) - Please choose one**

---

If  $a > 0$ , then the equation, in polar co-ordinates, of the form  $r^2 = a^2 \cos 2\theta$  represent which of the following family of curves?

- ▶ Lemniscate
- ▶ Cardioids
- ▶ Rose curves
- ▶ Spiral

---

**Question No: 15 ( Marks: 1 ) - Please choose one**

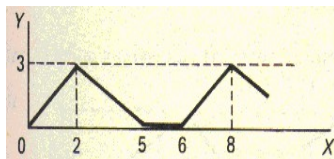
What is the period of a periodic function defined by  $f(x) = \sin \frac{x}{2}$ ?

- ▶  $\frac{\pi}{2}$
- ▶  $\pi$
- ▶  $\frac{3\pi}{2}$
- ▶  $4\pi$

---

**Question No: 16 ( Marks: 1 ) - Please choose one**

What is the period of periodic function whose graph is as below?



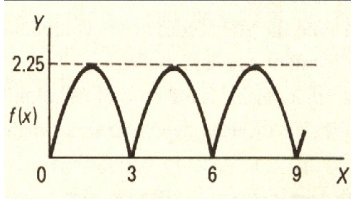
- ▶ 2
- ▶ 5
- ▶ 6
- ▶ 8

---

**Question No: 17 ( Marks: 1 ) - Please choose one**

What is the period of periodic function whose graph is as below?





- ▶ **0**
- ▶ 2.25
- ▶ 3
- ▶ 6

**Question No: 18 ( Marks: 1 ) - Please choose one**

Let  $L$  denotes the Laplace Transform.

If  $L\{F(t)\} = f(s)$  where  $s$  is a constant, then which of the following equation holds?

- ▶  $L\{t F(t)\} = -\frac{d}{ds}\{f(s)\}$
- ▶  $L\{t F(t)\} = f(s+t)$
- ▶  **$L\{t F(t)\} = f(s)$**
- ▶  $L\{t F(t)\} = \int_s^{\infty} f(s) ds$

**Question No: 19 ( Marks: 1 ) - Please choose one**

The graph of an odd function is symmetrical about -----

- ▶ x-axis
- ▶ y-axis
- ▶ **origin**

**Question No: 20 ( Marks: 1 ) - Please choose one**

Consider the function  $f(x, y, z) = \sqrt{1-x^2-y^2-z^2}$ . What is the value of

$$f\left(0, \frac{1}{2}, \frac{1}{2}\right) \square$$

- ▶  $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = \sqrt{\frac{1}{2}}$
- ▶  $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = 2$

- ▶  $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = \frac{1}{2}$
- ▶  $f\left(0, \frac{1}{2}, \frac{1}{2}\right) = 0$

**Question No: 21 ( Marks: 1 ) - Please choose one**

---

The path of integration of a line integral must be -----

- ▶ straight and single-valued
- ▶ **continuous and single-valued**
- ▶ straight and multiple-valued
- ▶ continuous and multiple-valued

**Question No: 22 ( Marks: 1 ) - Please choose one**

---

Sign of line integral is reversed when -----

- ▶ path of integration is divided into parts.
- ▶ path of integration is parallel to y-axis.
- ▶ **direction of path of integration is reversed.**
- ▶ path of integration is parallel to x-axis.

**Question No: 23 ( Marks: 1 ) - Please choose one**

---

Let the functions  $P(x, y)$  and  $Q(x, y)$  are finite and continuous inside and at the boundary of a closed curve  $C$  in the  $xy$ -plane.

If  $(P dx + Q dy)$  is an exact differential then

$$\oint_C (P dx + Q dy) =$$

- ▶ Zero
- ▶ **One**
- ▶ Infinite

**Question No: 24 ( Marks: 1 ) - Please choose one**

---

What is the value of  $L\{e^{5t}\}$  if  $L$  denotes laplace transform?

▶  $L\{e^{5t}\} = \frac{1}{s-5}$

▶  $L\{e^{5t}\} = \frac{s}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5}{s^2+25}$

▶  $L\{e^{5t}\} = \frac{5!}{s^6}$

---

**Question No: 25 ( Marks: 1 ) - Please choose one**

What is laplace transform of the function  $F(t)$  if  $F(t) = \sin 3t$  ?

▶  $L\{\sin 3t\} = \frac{3}{s^2+9}$

▶  $L\{\sin 3t\} = \frac{s}{s^2+9}$

▶  $L\{\sin 3t\} = \frac{1}{s-3}$

▶  $L\{\sin 3t\} = \frac{3!}{s^4}$

---

**Question No: 26 ( Marks: 1 ) - Please choose one**

If  $L$  denotes laplace transform then

$L\{te^{5t}\} =$

▶  $L\{te^{5t}\} = \frac{1}{s^2-5}$

▶  $L\{te^{5t}\} = \frac{1}{s^2+5}$

▶  $L\{te^{5t}\} = \frac{1}{(s+5)^2}$

▶  $L\{te^{5t}\} = \frac{1}{(s-5)^2}$

---

**Question No: 27 ( Marks: 1 ) - Please choose one**

---

Evaluate the line integral  $\int_C (3x+2y) dx + (2x-y) dy$  where  $C$  is the line segment from  $(0, 0)$  to  $(0, 2)$ .

- ▶ 1
- ▶ 0
- ▶ 2
- ▶ -2

**Question No: 28 ( Marks: 1 ) - Please choose one**

---

Evaluate the line integral  $\int_C (2x+y) dx + (x^2-y) dy$  where  $C$  is the line segment from  $(0, 0)$  to  $(0, 2)$ .

- ▶ -4
- ▶ -2
- ▶ 0
- ▶ 2

**Question No: 29 ( Marks: 1 ) - Please choose one**

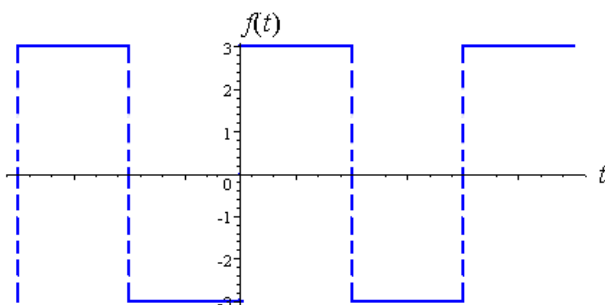
---

Divergence of a vector function is always a -----

- ▶ Scalar
- ▶ Vector

**Question No: 30 ( Marks: 1 ) - Please choose one**

---



Which of the following is true for a function whose graph is given above

- ▶ An odd function
- ▶ An even function
- ▶ Neither even nor odd

**Question No: 31 ( Marks: 2 )**

---

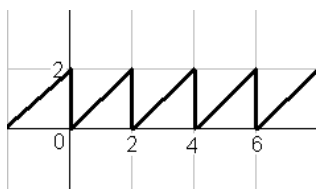
Does the following limit exist? If yes find its value, if no give reason

$$\lim_{t \rightarrow 0} \left[ (e^{2t} + 5)\hat{i} + (t^2 + 2t - 3)\hat{j} + \left(\frac{1}{t}\right)\hat{k} \right]$$

**Question No: 32 ( Marks: 2 )**

---

Define the periodic function whose graph is shown below.



**Question No: 33 ( Marks: 2 )**

---

Find Laplace Transform of the function  $F(t)$  if  $F(t) = t^4$

**Solution:**

The Laplace transform of the given function will be:

$$f(t) = t^4$$

$$L\{t^4\} = \frac{4!}{s^5}$$

**Question No: 34 ( Marks: 3 )**

---

Determine whether the following differential is exact or not.

$$dz = (4x^3y + 2xy^3) dx + (x^4 + 3x^2y^2) dy$$

**Question No: 35 ( Marks: 3 )**

---

Use Wallis sine formula to evaluate  $\int_0^{\frac{\pi}{2}} (\sin^3 x + \sin^5 x) dx$

**Solution:**

$$\int_0^{\frac{\pi}{2}} \sin^8 x dx = \frac{7}{8} \cdot \frac{5}{6} \cdot \frac{3}{4} \cdot \frac{1}{2} \text{-----} \frac{\pi}{2}$$

**Question No: 36 ( Marks: 3 )**

---

Find Laplace transform of the function  $F(t)$  if

$$F(t) = e^{2t} \sin 3t$$

**Solution:**

Laplace transform will be

$$L(t) = e^{2t} \dots\dots\dots 1$$

$$= \frac{1}{s-2}$$

$$L(t) = \sin 3t \dots\dots\dots 2$$

$$L(t) = \frac{a}{s^2 + 3^2}$$

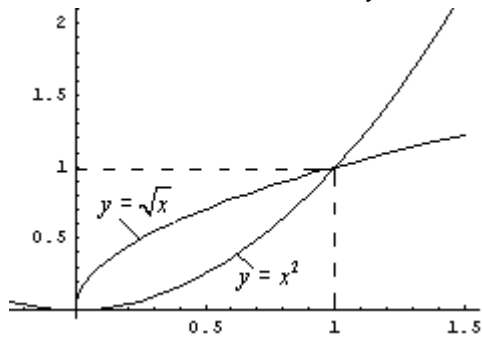
$$L(t) = \frac{a}{s^2 + 9}$$

Combining,

$$L(t) = \left(\frac{1}{s-2}\right)\left(\frac{a}{s^2+9}\right)$$

**Question No: 37 ( Marks: 5 )**

Using definite integral, find area of the region that is enclosed between the curves  $y = x^2$  and  $y = \sqrt{x}$



**Question No: 38 ( Marks: 5 )**

Determine the fourier co-efficient  $b_n$  of the following function.

$$f(x) = x^2 \quad 0 < x < 2\pi$$

**Question No: 39 ( Marks: 5 )**

---

Determine whether the following vector field  $\vec{F}$  is conservative or not.

$$\vec{F}(x, y, z) = (4x - z)\hat{i} + (3y + z)\hat{j} + (y - x)\hat{k}$$

ASSALAM O ALAIKUM  
All Dearz fellows  
ALL IN ONE MTH301  
Final term PAPERS & MCQz  
Created BY Farhan & Ali  
BS (cs) 2nd sem  
Hackers Group  
From Mandi Bahauddin  
Remember us in your prayers

[Mindhacker124@gmail.com](mailto:Mindhacker124@gmail.com)  
[Hearthacker124@gmail.com](mailto:Hearthacker124@gmail.com)

**FINAL TERM EXAMINATION**  
Fall 2009



MTH301- Calculus II

Time: 120 min

Marks: 80

**Question No: 1 ( Marks: 1 ) - Please choose one**

---

$\pi$  is an example of -----

- ▶ Irrational numbers
- ▶ Rational numbers
- ▶ Integers
- ▶ Natural numbers

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

Straight line is a special kind of -----

- ▶ Surface
- ▶ Curve
- ▶ Plane

- ▶ Parabola

**Question No: 3 ( Marks: 1 ) - Please choose one**

---

An ordered triple corresponds to ----- in three dimensional space.

- ▶ A unique point
- ▶ A point in each octant
- ▶ Three points
- ▶ Infinite number of points

**Question No: 4 ( Marks: 1 ) - Please choose one**

---

The angles which a line makes with positive x ,y and z-axis are known as -----

- ▶ Direction cosines
- ▶ Direction ratios
- ▶ Direction angles

**Question No: 5 ( Marks: 1 ) - Please choose one**

---

Is the function  $f(x, y)$  continuous at origin? If not, why?

$$f(x, y) = 4xy + \sin 3x^2y$$

▶  $f(x, y)$  is continuous at origin

▶  $f(0, 0)$  is not defined

▶  $f(0, 0)$  is defined but  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  does not exist

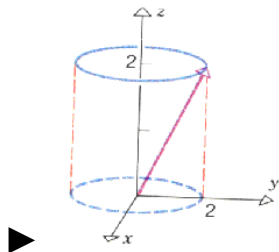
▶  $f(0, 0)$  is defined and  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  exists but these two numbers are not equal.

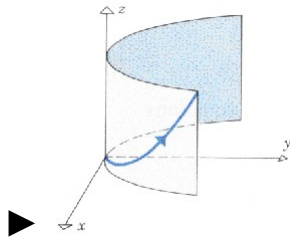
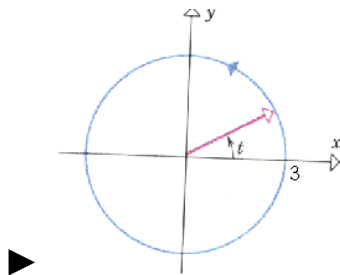
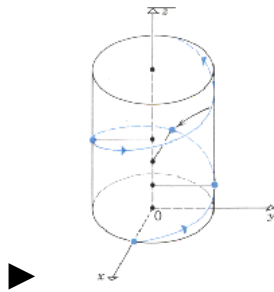
**Question No: 6 ( Marks: 1 ) - Please choose one**

---

Match the following vector-valued function with its graph.

$$r(t) = 3 \cos t \hat{i} + 3 \sin t \hat{j} \quad \text{and} \quad 0 \leq t \leq 2\pi$$



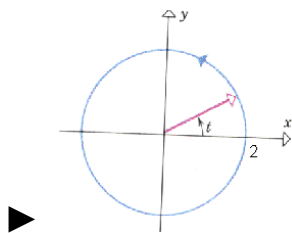
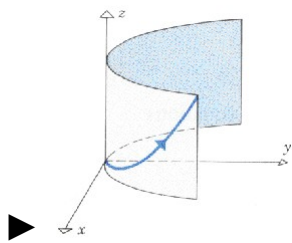
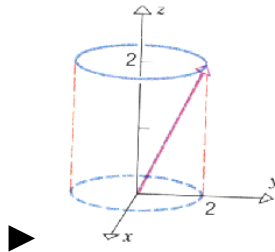
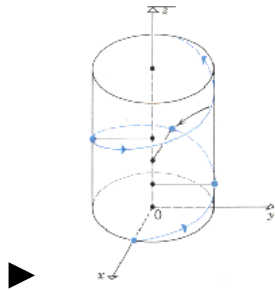


**Question No: 7 ( Marks: 1 ) - Please choose one**

---

Match the following vector-valued function with its graph.

$$r(t) = t\hat{i} + t^2\hat{j} + t^3\hat{k} \quad \text{and} \quad t \geq 0$$



**Question No: 8 ( Marks: 1 ) - Please choose one**

What are the parametric equations that correspond to the following vector equation?

$$\vec{r}(t) = \sin^2 t \hat{i} + (1 - \cos 2t) \hat{j}$$

▶  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 0$

▶  $y = \sin^2 t$  ,  $x = 1 - \cos 2t$  ,  $z = 0$

▶  $x = \sin^2 t$  ,  $y = 1 - \cos 2t$  ,  $z = 1$

▶  $x = \sin^2 t$  ,  $y = \cos 2t$  ,  $z = 1$

**Question No: 9 ( Marks: 1 ) - Please choose one**

---

Is the following vector-valued function  $\vec{r}(t)$  continuous at  $t=0$ ? If not, why?

$$\vec{r}(t) = (4\cos t, \sqrt{t}, 4\sin t)$$

▶  $\vec{r}(0)$  is not defined

▶  $\vec{r}(0)$  is defined but  $\lim_{t \rightarrow 0} \vec{r}(t)$  does not exist

▶  $\vec{r}(0)$  is defined and  $\lim_{t \rightarrow 0} \vec{r}(t)$  exists but these two numbers are not equal.

▶  $\vec{r}(t)$  is continuous at  $t=0$

**Question No: 10 ( Marks: 1 ) - Please choose one**

---

What is the derivative of following vector-valued function?

$$\vec{r}(t) = (\cos 5t, \tan t, 6 \sin t)$$

▶  $\vec{r}'(t) = \left( \frac{\sin 5t}{5}, \sec t, 6 \cos t \right)$

▶  $\vec{r}'(t) = \left( \frac{-\sin 5t}{5}, \sec t, 6 \cos t \right)$

▶  $\vec{r}'(t) = (-5 \sin 5t, \sec^2 t, 6 \cos t)$

▶  $\vec{r}'(t) = (\sin 5t, \sec^2 t, -6 \cos t)$

**Question No: 11 ( Marks: 1 ) - Please choose one**

---

The following differential is exact

$$dz = (3x^2y + 2) dx + (x^3 + y) dy$$

▶ True

▶ False

**Question No: 12 ( Marks: 1 ) - Please choose one**

---

The following differential is exact

$$dz = (3x^2 + 4xy) dx + (2x^2 + 2y) dy$$

▶ True

▶ False

**Question No: 13 ( Marks: 1 ) - Please choose one**

---

Which one of the following is correct Wallis Sine formula when  $n$  is odd and  $n \geq 3$ ?

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{5}{6} \frac{3}{4} \frac{1}{2}$

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{6}{7} \frac{4}{5} \frac{2}{3}$

▶  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

**Question No: 14 ( Marks: 1 ) - Please choose one**

---

Which of the following is correct?



▶  $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3}{16}$

▶  $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3\pi}{16}$

▶  $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{3}{8}$

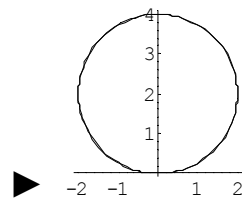
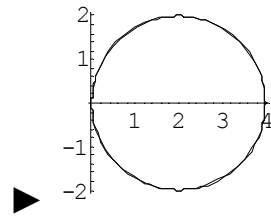
▶  $\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{2\pi}{3}$

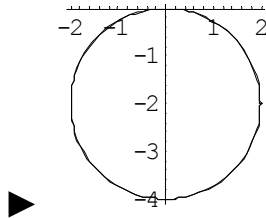
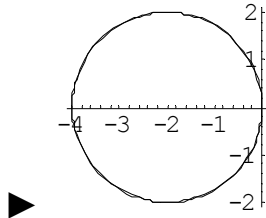
**Question No: 15 ( Marks: 1 ) - Please choose one**

---

Match the following equation in polar co-ordinates with its graph.

$r = 4 \sin \theta$





**Question No: 16 ( Marks: 1 ) - Please choose one**

---

If the equation of a curve, in polar co-ordinates, remains unchanged after replacing  $(r, \theta)$  by  $(r, \pi - \theta)$  then the curve is said to be symmetric about which of the following?

- ▶ Initial line
- ▶ y-axis
- ▶ Pole

**Question No: 17 ( Marks: 1 ) - Please choose one**

---

What is the period of a periodic function defined by  $f(x) = \sin \frac{x}{2}$ ?

- ▶  $\frac{\pi}{2}$

▶  $\pi$

▶  $\frac{3\pi}{2}$

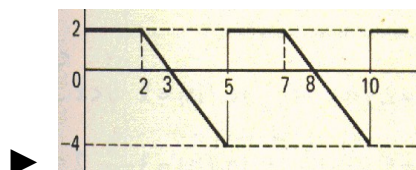
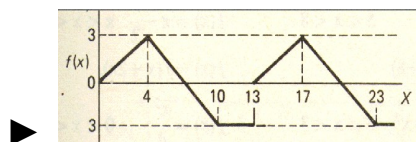
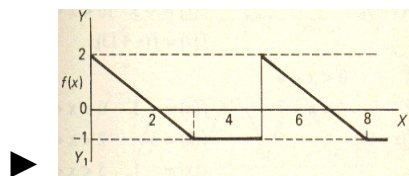
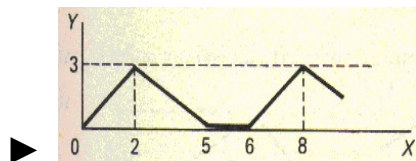
▶  $4\pi$

**Question No: 18 ( Marks: 1 ) - Please choose one**

---

Match the following periodic function with its graph.

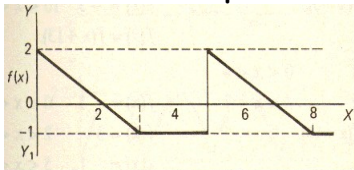
$$f(x) = \begin{cases} \frac{3}{4}x & 0 < x < 4 \\ 7-x & 4 < x < 10 \\ -3 & 10 < x < 13 \end{cases}$$



**Question No: 19 ( Marks: 1 ) - Please choose one**

---

What is the period of periodic function whose graph is as below?

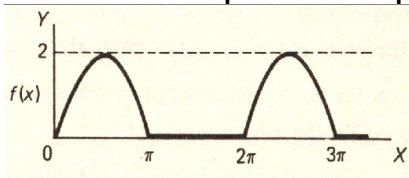


- ▶ 2
- ▶ 3
- ▶ 4
- ▶ 5

**Question No: 20 ( Marks: 1 ) - Please choose one**

---

What is the period of periodic function whose graph is as below?



- ▶ 0
- ▶ 2
- ▶  $\pi$

▶  $2\pi$

**Question No: 21 ( Marks: 1 ) - Please choose one**

---

Polar co-ordinates of a point are  $\left(-2, \frac{-3\pi}{2}\right)$ . Which of the following is another possible polar co-ordinates representation of this point?

▶  $\left(2, \frac{-\pi}{4}\right)$

▶  $\left(2, \frac{-\pi}{2}\right)$

▶  $\left(2, \frac{-\pi}{3}\right)$

▶  $\left(2, \frac{3\pi}{4}\right)$

**Question No: 22 ( Marks: 1 ) - Please choose one**

---

The function  $f(x) = x^3 e^x$  is -----

▶ Even function

▶ Odd function

- ▶ Neither even nor odd

**Question No: 23 ( Marks: 1 ) - Please choose one**

---

The graph of an even function is symmetrical about -----

- ▶ x-axis
- ▶ y-axis
- ▶ origin

**Question No: 24 ( Marks: 1 ) - Please choose one**

---

At which point the vertex of parabola, represented by the equation  $y = x^2 - 4x + 3$ , occurs?

- ▶ (0, 3)
- ▶ (2, -1)
- ▶ (-2, 15)
- ▶ (1, 0)

**Question No: 25 ( Marks: 1 ) - Please choose one**

---

The equation  $y = x^2 - 4x + 2$  represents a parabola. Find a point at which the vertex of given parabola occurs?

- ▶ (2, -2)
- ▶ (-4, 34)
- ▶ (0, 0)
- ▶ (-2, 14)

**Question No: 26 ( Marks: 1 ) - Please choose one**

---

Is the function  $f(x, y)$  continuous at origin? If not, why?

$$f(x, y) = \frac{xy}{x^2 + y^2}$$

- ▶  $f(x, y)$  is continuous at origin

▶  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  does not exist

▶  $f(0, 0)$  is defined and  $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$  exists but these two numbers are not equal.

**Question No: 27 ( Marks: 1 ) - Please choose one**

---

Sign of line integral is reversed when -----

- ▶ path of integration is divided into parts.

- ▶ path of integration is parallel to y-axis.
- ▶ direction of path of integration is reversed.
- ▶ path of integration is parallel to x-axis.

**Question No: 28 ( Marks: 1 ) - Please choose one**

---

What is Laplace transform of a function F(t)?

(s is a constant)

▶  $\int_0^s e^{-st} F(t) dt$

▶  $\int_0^{\infty} e^{st} F(t) dt$

▶  $\int_{-\infty}^{\infty} e^{-st} F(t) dt$

▶  $\int_0^{\infty} e^{-st} F(t) dt$

**Question No: 29 ( Marks: 1 ) - Please choose one**

---

What is the value of  $L\{e^{5t}\}$  if L denotes laplace transform?



$L\{e^{5t}\} = \frac{1}{s-5}$

$L\{e^{5t}\} = \frac{s}{s^2+25}$

$L\{e^{5t}\} = \frac{5}{s^2+25}$

$L\{e^{5t}\} = \frac{5!}{s^6}$

**Question No: 30 ( Marks: 1 ) - Please choose one**

---

What is the Laplace Inverse Transform of  $\frac{1}{s+1}$

$L^{-1}\left\{\frac{1}{s+1}\right\} = t+1$

$L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t} + e^t$

$L^{-1}\left\{\frac{1}{s+1}\right\} = e^t$

$L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t}$

**Question No: 31 ( Marks: 1 ) - Please choose one**

---

What is Laplace Inverse Transform of  $\frac{5}{s^2 + 25}$

$L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \sin 5t$

$L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \cos 5t$

$L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \sin 25t$

$L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \cos 25t$

**Question No: 32 ( Marks: 1 ) - Please choose one**

---

What is  $L\{-6\}$  if  $L$  denotes Laplace Transform?

$L\{-6\} = \frac{1}{s+6}$

$L\{-6\} = \frac{-6}{s}$

$L\{-6\} = \frac{s}{s^2 + 36}$

$L\{-6\} = \frac{-6}{s^2 + 36}$

**Question No: 33 ( Marks: 1 ) - Please choose one**

---

Evaluate the line integral  $\int_C (3x+2y) dx + (2x-y) dy$  where  $C$  is the line segment from  $(0, 0)$  to  $(2, 0)$ .

- ▶ 6
- ▶ -6
- ▶ 0
- ▶ Do not exist

**Question No: 34 ( Marks: 1 ) - Please choose one**

---

Evaluate the line integral  $\int_C (2x+y) dx + (x^2-y) dy$  where  $C$  is the line segment from  $(0, 0)$  to  $(0, 2)$ .

- ▶ -4
- ▶ -2
- ▶ 0
- ▶ 2

**Question No: 35 ( Marks: 1 ) - Please choose one**

---

Plane is an example of -----

▶ Curve

▶ Surface

▶ Sphere

▶ Cone

**Question No: 36 ( Marks: 1 ) - Please choose one**

---

If  $R = \{(x, y) / 0 \leq x \leq 2 \text{ and } -1 \leq y \leq 1\}$ , then

$$\iint_R (x + 2y^2) dA =$$

▶  $\int_{-1}^1 \int_0^2 (x + 2y^2) dy dx$

▶  $\int_0^2 \int_1^{-1} (x + 2y^2) dx dy$

$\int_{-1}^1 \int_0^2 (x + 2y^2) dx dy$

$\int_1^2 \int_{-1}^0 (x + 2y^2) dx dy$

**Question No: 37 ( Marks: 1 ) - Please choose one**

---

To evaluate the line integral, the integrand is expressed in terms of  $x, y, z$  with

$dr = dx \hat{i} + dy \hat{j}$

$dr = dx \hat{i} + dy \hat{j} + dz \hat{k}$

$dr = dx + dy + dz$

$dr = dx + dy$

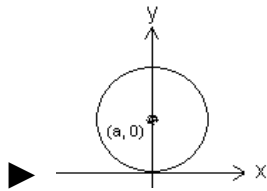
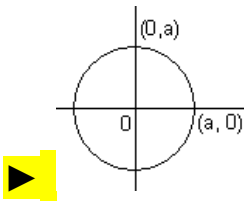
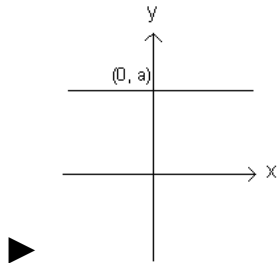
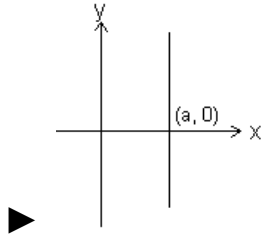
**Question No: 38 ( Marks: 1 ) - Please choose one**

---

Match the following equation in polar co-ordinates with its graph.

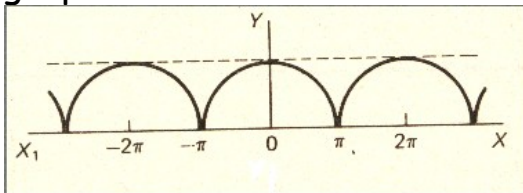
$r = a$

where  $a$  is an arbitrary constant.



**Question No: 39 ( Marks: 1 ) - Please choose one**

Which of the following is true for a periodic function whose graph is as below?

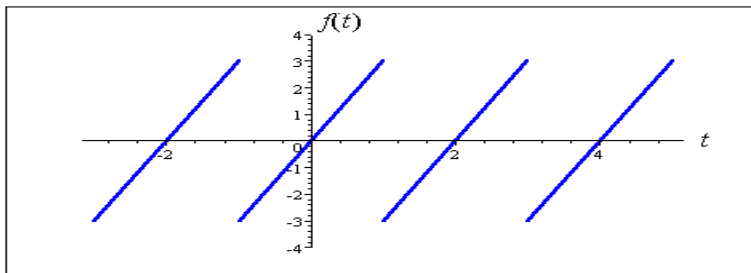


► Even function

- ▶ Odd function
- ▶ Neither even nor odd function

**Question No: 40 ( Marks: 1 ) - Please choose one**

---



The graph of "saw tooth wave" given above is -----

- ▶ An odd function
- ▶ An even function
- ▶ Neither even nor odd

Question No: 1 ( Marks: 2 ) - Please choose one

Laplace transform of 't' is

▶  $\frac{1}{s}$

▶  $\frac{1}{s^2}$

▶  $e^{-s}$

▶  $s$

Question No: 2 ( Marks: 2 ) - Please choose one

Symmetric equation for the line through (1,3,5) and (2,-2,3) is

▶  $x-2 = -\frac{y+2}{3} = -\frac{z-3}{5}$

▶  $x+2 = -\frac{y+3}{5} = -\frac{z+5}{2}$

▶  $x-1 = -\frac{y-3}{5} = -\frac{z-5}{2}$

▶  $x+1 = \frac{y+3}{5} = \frac{z-5}{5}$

Question No: 3 ( Marks: 1 ) - Please choose one



The level curves of  $f(x, y) = y \csc x$  are parabolas.

- ▶ True.
- ▶ False.

Question No: 4 ( Marks: 1 ) - Please choose one

The equation  $z = r$  is written in

- ▶ Rectangular coordinates
- ▶ Cylindrical coordinates
- ▶ Spherical coordinates
- ▶ None of the above

**FINAL TERM EXAMINATION**  
**Spring 2010**

**MTH301 - Calculus II (Session - 4)**

**Ref No: Time: 90 min**

**Marks: 60**

Student Info	
StudentID:	
Center:	OPKST
ExamDate:	07 Aug 2010



**Question No: 1 ( Marks: 1 ) - Please choose one**

---

There is one-to-one correspondence between the set of points on co-ordinate line and -----

- ▶ Set of real numbers
- ▶ Set of integers
- ▶ Set of natural numbers
- ▶ Set of rational numbers

**Question No: 2 ( Marks: 1 ) - Please choose one**

---

Straight line is a special kind of -----

- ▶ Surface
- ▶ Curve
- ▶ Plane
- ▶ Parabola

**Question No: 3 ( Marks: 1 ) - Please choose one**

---

$$\lim_{(x, y) \rightarrow (0, 0)} \frac{xy^2}{x^2 + y^2} =$$

- ▶  $\infty$
- ▶ 0
- ▶ 1
- ▶ 0.5

**Question No: 4 ( Marks: 1 ) - Please choose one**

---

If  $f(x, y) = x^2y - y^3 + \ln x$

then  $\frac{\partial^2 f}{\partial x^2} =$







► True

► False

**Question No: 12 ( Marks: 1 ) - Please choose one**

Which one of the following is correct Wallis Sine formula when  $n$  is even and  $n \geq 2$ ?

►   $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{5}{6} \frac{3}{4} \frac{1}{2}$

►   $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n-1)}{n} \frac{(n-3)}{(n-2)} \frac{(n-5)}{(n-4)} \dots \frac{6}{7} \frac{4}{5} \frac{2}{3}$

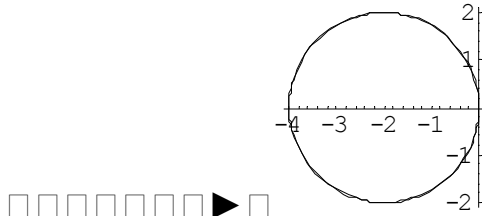
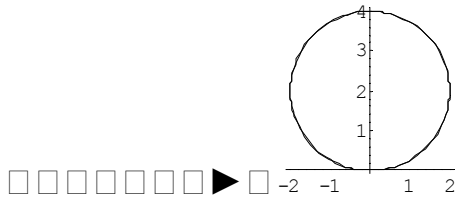
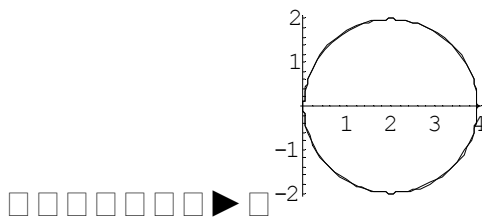
►   $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{\pi}{2} \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

►   $\int_0^{\frac{\pi}{2}} \sin^n x \, dx = \frac{(n)}{(n-1)} \frac{(n-2)}{(n-3)} \frac{(n-4)}{(n-5)} \dots \frac{6}{5} \frac{4}{3} \frac{2}{1}$

**Question No: 13 ( Marks: 1 ) - Please choose one**

Match the following equation in polar co-ordinates with its graph.

$r = 4 \sin \theta$







►

►

►

**Question No: 16 ( Marks: 1 ) - Please choose one**

Match the following periodic function with its graph.

$$f(x) = \begin{cases} 4 & 0 < x < 5 \\ 0 & 5 < x < 8 \end{cases}$$

►

►

►

►

**Question No: 17 ( Marks: 1 ) - Please choose one**

---

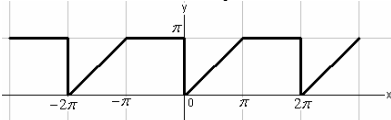
Which of the following condition must be satisfied for a vector field  $\vec{F}$  to be a conservative vector field?

- ▶  Line integral of  $\vec{F}$  along a curve, depends only on the endpoints of that curve, not on the particular route taken.
- ▶  Divergence of  $\vec{F}$  should be zero
- ▶  Gradient of  $\vec{F}$  should be zero.
- ▶   $\vec{F} = 0$

**Question No: 18 ( Marks: 1 ) - Please choose one**

---

What is the period of periodic function whose graph is as below?



- ▶   $\pi$
- ▶   $-\pi$
- ▶   $2\pi$
- ▶   $-2\pi$

**Question No: 19 ( Marks: 1 ) - Please choose one**

---

Let  $L$  denotes the Laplace Transform.

According to First Shift Theorem, if  $L\{F(t)\} = f(s)$  then which of the following equation holds?

$s$  and  $a$  are constants.

- ▶   $L\{e^{-at} F(t)\} = f(s-a)$
- ▶   $L\{e^{-at} F(t)\} = f(s+a)$
- ▶   $L\{e^{-at} F(t)\} = f(s)$
- ▶   $L\{e^{-at} F(t)\} = f(a)$

**Question No: 20 ( Marks: 1 ) - Please choose one**

---

Polar co-ordinates of a point are  $\left(7, \frac{-\pi}{4}\right)$ . Which of the following is another possible polar co-ordinates representation of this point?

- ▶   $\left(7, \frac{3\pi}{4}\right)$



**Question No: 24 ( Marks: 1 ) - Please choose one**

---

Sign of line integral is reversed when -----

- path of integration is divided into parts.
- path of integration is parallel to y-axis.
- direction of path of integration is reversed.
- path of integration is parallel to x-axis.

**Question No: 25 ( Marks: 1 ) - Please choose one**

---

Let the functions  $P(x, y)$  and  $Q(x, y)$  are finite and continuous inside and at the boundary of a closed curve  $C$  in the  $xy$ -plane.

If  $(P dx + Q dy)$  is an exact differential then

$$\oint_C (P dx + Q dy) =$$

- ▶ Zero
- ▶ One
- ▶ Infinite

**Question No: 26 ( Marks: 1 ) - Please choose one**

---

What is laplace transform of the function  $F(t)$  if  $F(t) = \cos 2t$  ?

- ▶  $L\{\cos 2t\} = \frac{2}{s^2 + 4}$
- ▶  $L\{\cos 2t\} = \frac{1}{s - 2}$
- ▶  $L\{\cos 2t\} = \frac{s}{s^2 + 4}$
- ▶  $L\{\cos 2t\} = \frac{2!}{s^3}$

**Question No: 27 ( Marks: 1 ) - Please choose one**

---

What is  $L\{-6\}$  if  $L$  denotes Laplace Transform?

▶  $L\{-6\} = \frac{1}{s+6}$

▶  $L\{-6\} = \frac{-6}{s}$

▶  $L\{-6\} = \frac{s}{s^2+36}$

▶  $L\{-6\} = \frac{-6}{s^2+36}$

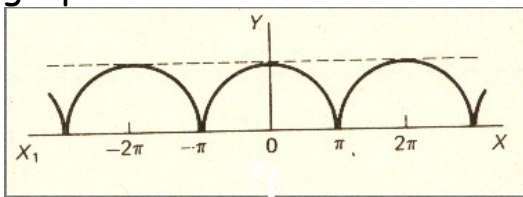
**Question No: 28 ( Marks: 1 ) - Please choose one**

Curl of vector function is always a -----

- ▶ Scalar
- ▶ Vector

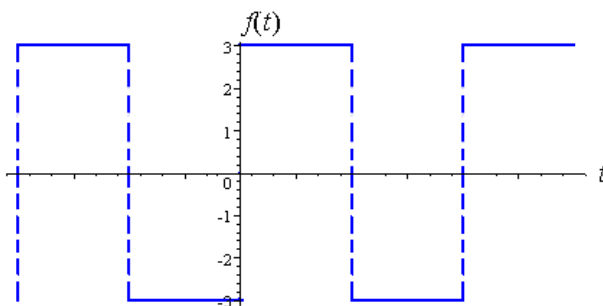
**Question No: 29 ( Marks: 1 ) - Please choose one**

Which of the following is true for a periodic function whose graph is as below?



- ▶ Even function
- ▶ Odd function
- ▶ Neither even nor odd function

**Question No: 30 ( Marks: 1 ) - Please choose one**



Which of the following is true for a function whose graph is given above

- ▶ An odd function
- ▶ An even function
- ▶ Neither even nor odd

**Question No: 31 ( Marks: 2 )**

---

Evaluate the line integral  $\int_C 2x \, dx$  where  $C$  is the line segment from  $(0, 2)$  to  $(2, 6)$

**Question No: 32 ( Marks: 2 )**

---

Use Wallis sine formula to evaluate  $\int_0^{\frac{\pi}{2}} \sin^5 x \, dx$

**Question No: 33 ( Marks: 2 )**

---

Find Laplace Transform of the function  $F(t)$  if  $F(t) = \sin 2t$  .

**Question No: 34 ( Marks: 3 )**

---

Find  $\text{div } \vec{F}$  , if  $\vec{F} = (3x + y)\hat{i} + xy^2z\hat{j} + (xz^2)\hat{k}$

**Question No: 35 ( Marks: 3 )**

---

Determine whether the following differential is exact or not.

$$dz = (4x^3y + 2xy^3) \, dx + (x^4 + 3x^2y^2) \, dy$$

**Question No: 36 ( Marks: 3 )**

---

Prove whether the following function is even, odd or neither.

$$f(x) = x^3 e^x$$

**Question No: 37 ( Marks: 5 )**

---

Evaluate the following line integral which is independent of path.

$$\int_{(2,-2)}^{(-1,0)} (2xy^3) dx + (3y^2x^2) dy$$

**Question No: 38 ( Marks: 5 )**

---

Determine the fourier co-efficient  $b_n$  of the following function.

$$f(x) = x^2 \quad 0 < x < 2\pi$$

**Question No: 39 ( Marks: 5 )**

---

Determine whether the following vector field  $\vec{F}$  is conservative or not.

$$\vec{F}(x, y, z) = (3x + y)\hat{i} + xy^2z\hat{j} + xz^2\hat{k}$$

ASSALAM O ALAIKUM

All Dearz fellows

ALL IN ONE MTH301

Final term PAPERS &

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BS (cs) 2nd sem

Hackers Group

From Mandi Bahauddin

Remember us in your prayers

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