

Final term mcq calculus (Mth301)

FINALTERM EXAMINATION

MTH301- Calculus II

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

Q 1.

Intersection of two straight lines is -----

►Surface

►Curve

a.

►Plane pg 13

•

►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

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

► $\frac{\partial w}{\partial x} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial y} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial z} \frac{\partial z}{\partial r}$ pg 50

► $\frac{\partial w}{\partial r} \frac{\partial x}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial y}{\partial r} + \frac{\partial w}{\partial r} \frac{\partial z}{\partial r}$

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

► $\frac{\partial w}{\partial r} \frac{\partial r}{\partial x} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial y} + \frac{\partial w}{\partial r} \frac{\partial r}{\partial z}$

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

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

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

► $x = \sin^2 t$, $y = 1 - \cos 2t$, $z = 0$ pg 140

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

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

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

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

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

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

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

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

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

► $x = 2t-1$, $y = -3\sqrt{t}$, $z = \sin 3t$ pg 140

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

What is the derivative of following vector-valued function?

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

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

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

► $\vec{r}'(t) = (-5 \sin 5t, \sec^2 t, 6 \cos t)$ According to formula at pg 145

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

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

What is the derivative of following vector-valued function?

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

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

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

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

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

Correct answer according to derivative property

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

The following differential is exact

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

▶ True

▶ False formula at pg 155

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

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

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

pg 182



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



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



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

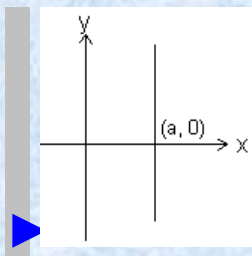


Question No: 10 (Marks: 1) - Please choose one

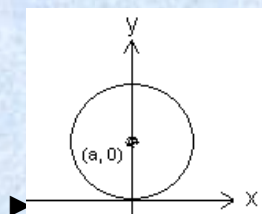
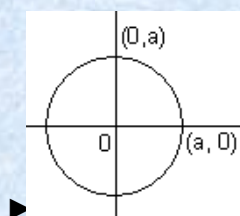
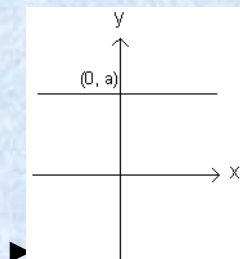
Match the following equation in polar co-ordinates with its graph.

$$r \cos \theta = a$$

where a is an arbitrary constant



pg 126



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

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

►Initial line

►y-axis pg 128

►Pole

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

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

►Initial line

►y-axis

►Pole pg 128

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

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

What is the amplitude of a periodic function defined by ?

►0

►1 pg 197

$\frac{1}{3}$

►

►Does not exist

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

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

▶ $\frac{\pi}{4}$

▶ $\frac{\pi}{3}$

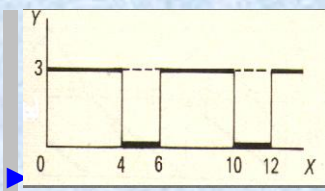
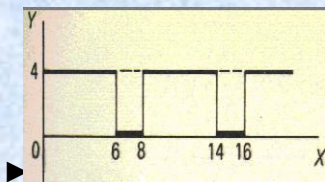
▶ $\frac{2\pi}{3}$ pg 197

▶ π

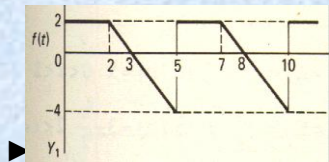
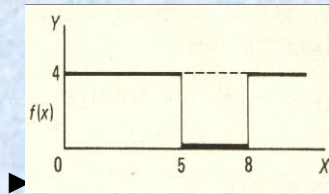
Question No: 15 (Marks: 1) - Please choose one

Match the following periodic function with its graph.

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

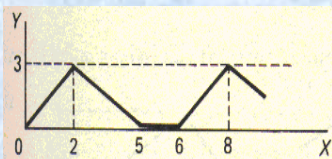


pg 197



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

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



►2

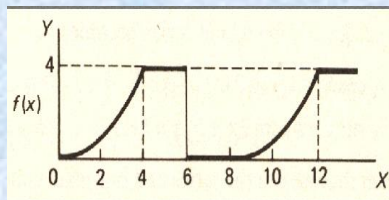
►5

►6 pg 197

►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 pg 198

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?

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

►

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



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

pg 227



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



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

Which of the following is Laplace inverse transform of the function $f(s)$ defined by

$$f(s) = \frac{3}{s-2} - \frac{2}{s}$$

?

► $3te^{2t} - 2$

► $3e^{2t} - 2t$

► $3e^{2t} - 2$ correct answer

► 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 pg 11

►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 pg 170

►One

►Infinite

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

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

► $L\{t\} = \frac{1}{s}$ pg 222 Laplace transform of constant = a/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?

► $L\{e^{5t}\} = \frac{1}{s-5}$ pg 222

► $L\{e^{5t}\} = \frac{s}{s^2 + 25}$

► $L\{e^{5t}\} = \frac{5}{s^2 + 25}$

► $L\{e^{5t}\} = \frac{5!}{s^6}$

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

$$\int_C (3x + 2y) dx + (2x - y) dy$$

Evaluate the line integral
2).

where C is the line segment from (0, 0) to (0,

▶1

▶0

▶2 keeping $x=0, dx=0$ and limits of y 0 to 2

▶-2

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

$$\int_C (2x + y) dx + (x^2 - y) dy$$

Evaluate the line integral
0).

where C is the line segment from (0, 0) to (2,

▶0

▶-4

▶4 putting $y=0, dy=0$ and x from 0 to 2

▶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 pg 13

▶ $2, -3$ 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

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

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

▶

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

▶

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

Correct answer

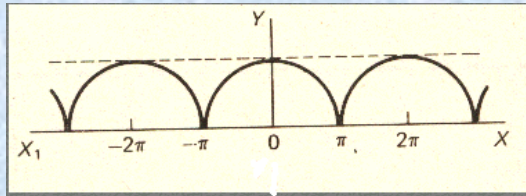
▶

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

▶

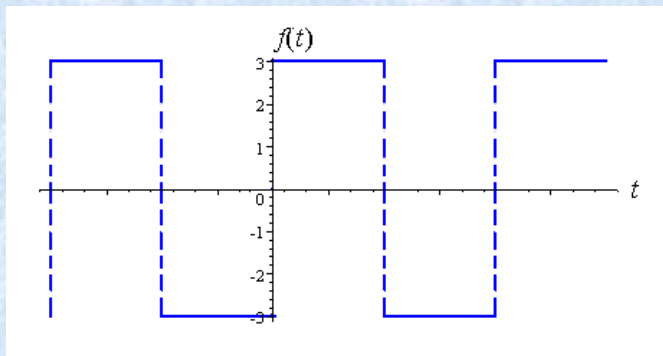
Question No: 28 (Marks: 1) - Please choose one

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



- ▶Even function pg 208
- ▶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 pg 207
- ▶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

Solution:

In domain function is always defined but may be discontinuous

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

π is an example of -----

▶ Irrational numbers pg 3

▶ Rational numbers

▶ Integers

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

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

- ▶ Surface
- ▶ Curve
- ▶ [Plane pg 13](#)
- ▶ Parabola

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 pg 11](#)

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

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

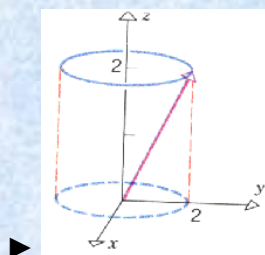
$$f(x, y) = 4xy + \sin 3x^2y$$

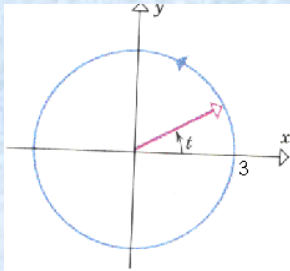
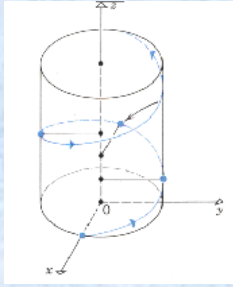
- ▶ $f(x, y)$ is continuous at origin
- ▶ $f(0, 0)$ is not defined
- ▶ $f(0, 0)$ is defined but $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ does not exist
- ▶ $f(0, 0)$ is defined and $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ exists but these two numbers are not equal.

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

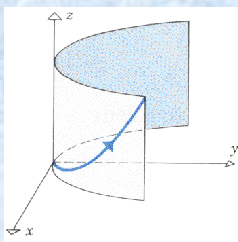
Match the following vector-valued function with its graph.

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





pg 141



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: 13 (Marks: 1) - Please choose one

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

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

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

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

pg 182

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



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

Which of the following is correct?

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



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

pg 181



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



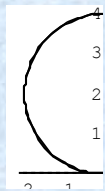
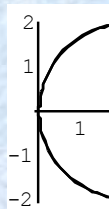
$$\int_0^{\frac{\pi}{2}} \sin^4 x \, dx = \frac{2\pi}{3}$$



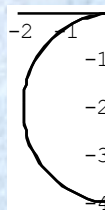
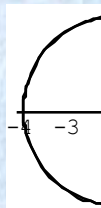
Question No: 15 (Marks: 1) - Please choose one

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

$$r = 4\sin\theta$$



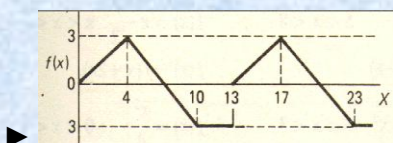
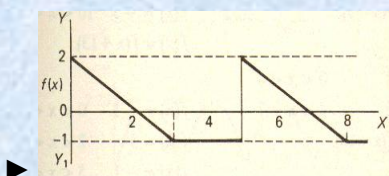
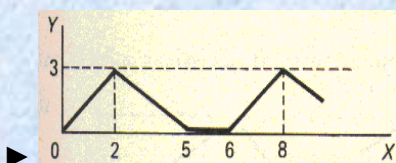
not sure



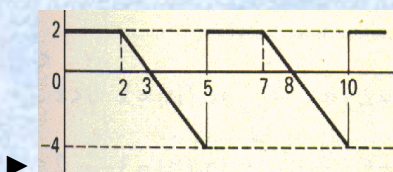
Question No: 18 (Marks: 1) - Please choose one

Match the following periodic function with its graph.

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

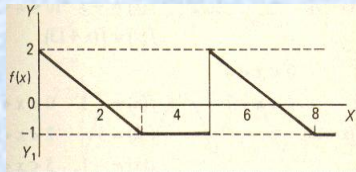


pg 198



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

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



► 2

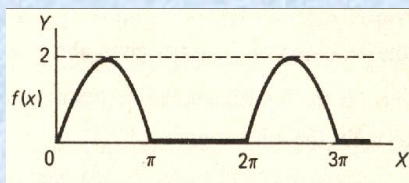
► 3

► 4

► 5 pg 198

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

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



► 0

► 2

► π

► 2π pg 198

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

$$\left(-2, \frac{-3\pi}{2}\right)$$

Polar co-ordinates of a point are . Which of the following is another possible polar co-ordinates representation of this point?

▶ $\left(2, \frac{-\pi}{4}\right)$

▶ $\left(2, \frac{-\pi}{2}\right)$

▶ $\left(2, \frac{-\pi}{3}\right)$

▶ $\left(2, \frac{3\pi}{4}\right)$ not sure

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 pg 209

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

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

- ▶ x-axis
- ▶ y-axis pg 207
- ▶ 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) pg 9
- ▶ (-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) pg 9
- ▶ (-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

► $\lim_{(x,y) \rightarrow (0,0)} f(x, y)$ limit does not exist [pg 27](#)

► $f(0, 0)$ 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. Pg 175](#)
- 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)

► $\int_0^s e^{-st} F(t) dt$

► $\int_0^\infty e^{st} F(t) dt$

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

► $\int_0^\infty e^{-st} F(t) dt$ **pg 222**

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

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

► $L\{e^{5t}\} = \frac{1}{s-5}$ **according to pg 223**

► $L\{e^{5t}\} = \frac{s}{s^2 + 25}$

► $L\{e^{5t}\} = \frac{5}{s^2 + 25}$

► $L\{e^{5t}\} = \frac{5!}{s^6}$

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

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

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

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

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

► $L^{-1}\left\{\frac{1}{s+1}\right\} = e^{-t}$ **pg 231 formula**

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

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

► $L^{-1}\left\{\frac{5}{s^2 + 25}\right\} = \sin 5t$ **pg 231**

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

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

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

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

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

► $L\{-6\} = \frac{1}{s+6}$

► $L\{-6\} = \frac{-6}{s}$ pg 223

► $L\{-6\} = \frac{s}{s^2+36}$

► $L\{-6\} = \frac{-6}{s^2+36}$

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

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

► $dr = dx\hat{i} + dy\hat{j}$

► $dr = dx\hat{i} + dy\hat{j} + dz\hat{k}$ pg 185

► $dr = dx + dy + dz$

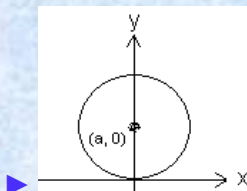
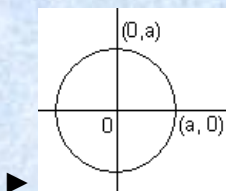
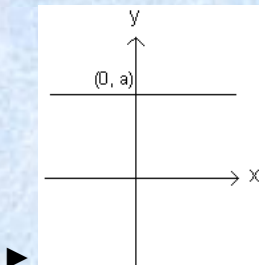
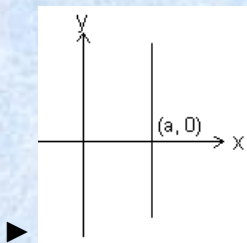
► $dr = dx + dy$

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

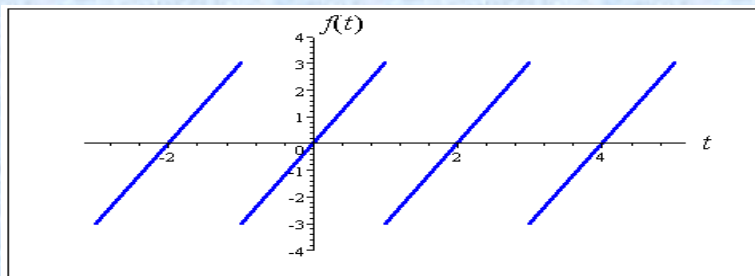
Match the following equation in polar co-ordinates with its graph.

$$r = a$$

where a is an arbitrary constant.



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



The graph of “saw tooth wave” given above is -----

- ▶ An odd function because it is passing through the region
- ▶ An even function
- ▶ Neither even nor odd

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