



Virtual University

About Us

MTH301
Solved Final Term Paper 5

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Year
2017

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

In the Name of Allāh, the Most Gracious, the Most Merciful

Paper Pattern

MCQS 40 each 1 mark
Short 4 each 2 marks
Short 4 each 3 marks
long 4 each 5 marks

Question No : 1 of 52

Marks: 1 (Budgeted Time 1 Min)

What is the derivative of following vector-valued function?

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

Answer (Please select your correct option)

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

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

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

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

correct

Made by: Waqar Siddhu

Question No : 2 of 52

Marks: 1 (Budgeted Time 1 Min)

What is the derivative of following vector-valued function?

$$\vec{r}(t) = \left(e^{t^2}, t^2, \sec 2t \right)$$

Answer (Please select your correct option)

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☐ $\vec{r}'(t) = \left(2te^{t^2}, 2t, 2\sec 2t \tan 2t \right)$

☐ $\vec{r}'(t) = \left(te^{t^2}, 2t, \sec 2t \tan 2t \right)$

correct

☐ $\vec{r}'(t) = \left(2te^{t^2}, 2t, \tan 2t \right)$

☐ $\vec{r}'(t) = \left(t^2 e^{t^2}, 2t, \sec 2t \tan 2t \right)$

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Question No : 3 of 52

Marks: 1 (Budgeted Time 1 Min)

Evaluate the integral $\int \left[(3t-1)\hat{i} + \sqrt{t}\hat{j} \right] dt$

Answer (Please select your correct option)

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☐ $\int \left[(3t-1)\hat{i} + \sqrt{t}\hat{j} \right] dt = \left(\frac{3}{2}t^2 - t \right)\hat{i} + \left(\frac{3}{2}t^{\frac{3}{2}} \right)\hat{j} + C$

☐ $\int \left[(3t-1)\hat{i} + \sqrt{t}\hat{j} \right] dt = \left(\frac{3}{2}t^2 - t \right)\hat{i} + \left(\frac{2}{3}t^{\frac{3}{2}} \right)\hat{j} + C$

correct

☐ $\int \left[(3t-1)\hat{i} + \sqrt{t}\hat{j} \right] dt = \left(\frac{3}{2}t - t \right)\hat{i} + \left(\frac{2}{3}t^{\frac{3}{2}} \right)\hat{j} + C$

☐ $\int \left[(3t-1)\hat{i} + \sqrt{t}\hat{j} \right] dt = \left(\frac{3}{2}t^2 - t \right)\hat{i} + \left(\frac{1}{2}t^{\frac{3}{2}} \right)\hat{j} + C$

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Question No : 4 of 52

Marks: 1 (Budgeted Time 1 Min)

The following differential is exact
 $dz = (6xy + 2y^2 - 5) dx + (3x^2 + 4xy - 6) dy$

Answer (Please select your correct option)

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True

☐correct

False

☐

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Question No : 5 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ 1

☐ 3

☐ 4
correct
☐ 12

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Question No : 6 of 52

Marks: 1 (Budgeted Time 1 Min)

What is the period of a periodic function defined by $f(x) = 4 \sin 2x$?

Answer (Please select your correct option)

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☐ 2° ☐ 4° ☐ 8° ☐ 180° correct☐ 360°

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Question No : 7 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ $\frac{\pi}{2}$ ☐ π ☐ $\frac{3\pi}{2}$ ☐ 4π

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Question No : 8 of 52

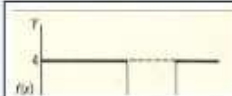
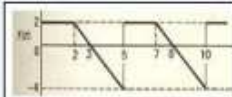
Marks: 1 (Budgeted Time 1 Min)

Match the following periodic function with its graph.

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

Answer (Please select your correct option)

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☐☐☐correct☐

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Question No : 9 of 52

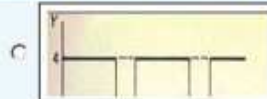
Marks: 1 (Budgeted Time 1 Min)

Match the following periodic function with its graph.

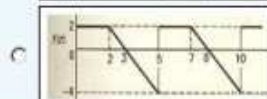
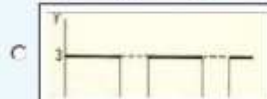
$$f(x) = \begin{cases} 4 & 0 < x < 6 \\ 0 & 6 < x < 8 \end{cases}$$

Answer (Please select your correct option)

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correct

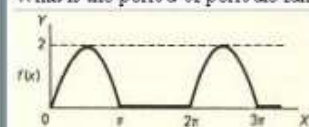


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Question No : 10 of 52

Marks: 1 (Budgeted Time 1 Min)

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



Answer (Please select your correct option)

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☐ 0

☐ 2

☐ π

☐ 2π

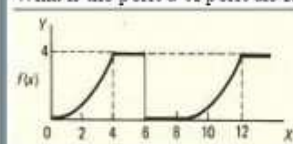
correct

Made by: Waqar Siddhu

Question No : 11 of 52

Marks: 1 (Budgeted Time 1 Min)

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



Answer (Please select your correct option)

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☐ 0

☐ 4

☐ 6

☐ 8

correct

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Question No : 12 of 52

Marks: 1 (Budgeted Time 1 Min)

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?

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

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

☐ $L\left(\frac{F(t)}{t}\right) = \int_0^\infty f(s) ds$

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

correct

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Question No : 13 of 52

Marks: 1 (Budgeted Time 1 Min)

The function $f(x) = x^2 \cos 2x$ is -----
☐ Neither even nor odd

☐ Odd function

☐ Even function
correct

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Question No : 14 of 52

Marks: 1 (Budgeted Time 1 Min)

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

☐ x-axis

☐ y-axis

☐ origin
correct

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Question No : 15 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ x-axis☐☐ y-axis☐☐ origin☐correct

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Question No : 16 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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

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Question No : 17 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ $L(\cos 2t) = \frac{2}{s^2 + 4}$ correct☐ $L(\cos 2t) = \frac{1}{s-2}$ ☐ $L(\cos 2t) = \frac{s}{s^2 + 4}$ ☐ $L(\cos 2t) = \frac{2!}{s^3}$

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Question No : 18 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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

correct

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

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

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

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Question No : 19 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ 1

☐ 0

☐ 2
correct
☐ -2

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Question No : 20 of 52

Marks: 1 (Budgeted Time 1 Min)

Evaluate the line integral $\int_C (xy) dx + (1 + y^2) dy$ where C is the line segment from $(1, 0)$ to $(3, 0)$.

Answer (Please select your correct option)

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☐ -4

☐ 0
correct
☐ 4

☐ Do not exist

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Question No : 21 of 52

Marks: 1 (Budgeted Time 1 Min)

If p is the period of a function then that function is said to be periodic if $f(x + p) = f(x)$. _____

Answer (Please select your correct option)

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For all values of x in the domain of f

☐correct

For positive values of x in the domain of f

☐

For negative values of x in the domain of f

☐

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Question No : 22 of 52

Marks: 1 (Budgeted Time 1 Min)

A vector field is a vector each of whose components is a scalar field

Answer (Please select your correct option)

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True

☐

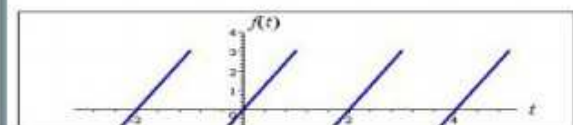
False

☐correct

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Question No : 23 of 52

Marks: 1 (Budgeted Time 1 Min)



Answer (Please select your correct option)

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An odd function

☐

An even function

☐

Neither even nor odd

☐

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Question No : 24 of 52

Marks: 1 (Budgeted Time 1 Min)

Which of the following set is the union of sets of rational and irrational numbers?

Answer (Please select your correct option)

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☐ Set of rational numbers☐ Set of integers☐ Set of real numberscorrect☐ Empty set.

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Question No : 25 of 52

Marks: 1 (Budgeted Time 1 Min)

$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$ shows (x_1, y_1, z_1) and (x_2, y_2, z_2) .

Answer (Please select your correct option)

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☐ Distance between the pointscorrect☐ Midpoint of the line joining the points☐ Ratio between the points

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Question No : 26 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ $y < x^2$ ☐ $y \geq x^2$ correct☐ $y \neq x^2$ ☐ Entire space

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Question No : 27 of 52

Marks: 1 (Budgeted Time 1 Min)

If rectangular co-ordinates of a point are $(1, \sqrt{3}, -2)$, then value of "r" in cylindrical co-ordinates is

Answer (Please select your correct option)

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☐ $\sqrt{2}$

☐ 2

☐ $2\sqrt{2}$

☐ $-2\sqrt{2}$

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Question No : 28 of 52

Marks: 1 (Budgeted Time 1 Min)

Suppose $f(x, y) = x^3 e^y$. Which of the following options is correct?

Answer (Please select your correct option)

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☐ $\frac{\partial f}{\partial y} = 3x^3 e^y$

☐ $\frac{\partial f}{\partial y} = x^3 e^y$

☐ $\frac{\partial f}{\partial y} = x^4 e^y$

correct

☐ $\frac{\partial f}{\partial y} = x^3 y e^y$

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Question No : 29 of 52

Marks: 1 (Budgeted Time 1 Min)

The function decreases most rapidly in the direction of

Answer (Please select your correct option)

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☐ $-\nabla f$

correct

☐ $-\|\nabla f\|$

☐ $\nabla f \times \hat{a}$

☐ $\|\nabla f\|$

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Question No : 30 of 52

Marks: 1 (Budgeted Time 1 Min)

Two surfaces are said to be orthogonal at the point of their intersection if their normals at that point are -----

Answer (Please select your correct option)

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☐

Parallel

☐

Perpendicular

correct☐

In opposite direction

☐

Overlapping

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Question No : 31 of 52

Marks: 1 (Budgeted Time 1 Min)

For a function $f(x, y)$ to have both absolute maximum and minimum, it must be Continuous on set R.

Answer (Please select your correct option)

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☐

a closed and bounded

☐

an open and bounded

☐

a closed and unbounded

☐

an open and unbounded

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Question No : 32 of 52

Marks: 1 (Budgeted Time 1 Min)

If $R = \{(x, y) : 2 \leq x \leq 4 \text{ and } 0 \leq y \leq 1\}$, then $\iint_R (4xe^{2y}) dA = \dots\dots\dots$

Answer (Please select your correct option)

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☐ $\int_0^1 \int_2^4 (4xe^{2y}) dy dx$ ☐ $\int_0^1 \int_2^4 (4xe^{2y}) dx dy$ ☐ $\int_1^4 \int_0^2 (4xe^{2y}) dx dy$ ☐ $\int_1^4 \int_0^2 (4xe^{2y}) dy dx$

Made by: Waqar Siddhu

Question No : 33 of 52

Marks: 1 (Budgeted Time 1 Min)

Let R be a closed region in two dimensional space then the double integral over R calculates.

Answer (Please select your correct option)

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C

Area of R.

C

Radius of inscribed circle in R.

C

Distance between two endpoints of R.

C

None of these

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Question No : 34 of 52

Marks: 1 (Budgeted Time 1 Min)

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

$$r \cos \theta = a$$

where a is an arbitrary constant.

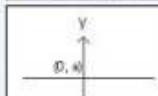
Answer (Please select your correct option)

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C



C



C



C



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Question No : 35 of 52

Marks: 1 (Budgeted Time 1 Min)

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?

Answer (Please select your correct option)

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C

$$\left(2, \frac{-\pi}{4}\right)$$

C

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

C

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

C

$$\left(2, \frac{3\pi}{4}\right)$$

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Question No : 36 of 52

Marks: 1 (Budgeted Time 1 Min)

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

Answer (Please select your correct option)

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☐ Initial line☐ y-axiscorrect☐ Pole☐ origin

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Question No : 37 of 52

Marks: 1 (Budgeted Time 1 Min)

The graph of curve $r^2 = 4 \cos 2\theta$ is symmetric about

Answer (Please select your correct option)

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☐ Initial linecorrect☐ y-axis☐ both initial line and y-axis☐ none of these

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Question No : 38 of 52

Marks: 1 (Budgeted Time 1 Min)

If $p(r, \theta)$ is a point in polar coordinate system, then r is the distance of p from

Answer (Please select your correct option)

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☐ Pole☐ Imaginary axis☐ None of these☐ Polar axis

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Question No : 39 of 52

Marks: 1 (Budgeted Time 1 Min)

The point $p(0, \theta)$ in polar coordinate system lies on

Answer (Please select your correct option)

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C

Polar axis

C

y-axis

C

Pole

C

None of these

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Question No : 40 of 52

Marks: 1 (Budgeted Time 1 Min)

Given the integral $\iint_R f(x, y) dx dy$, after converting to polar coordinates, it will become where $a \leq \theta \leq b$ and $c \leq r \leq d$.

Answer (Please select your correct option)

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C

 $\int_a^b \int_c^d f(r, \theta) r dr d\theta$

C

 $\int_a^b \int_c^d f(r, \theta) dr d\theta$

C

 $\int_a^b \int_c^d f(r, \theta) r d\theta dr$

C

 $\int_a^b \int_c^d f(r, \theta) d\theta dr$

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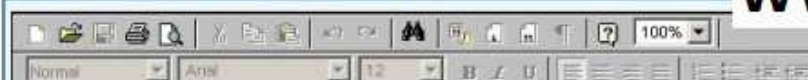
Question No : 41 of 52

Marks: 2 (Budgeted Time 4 Min)

Determine whether the following differential is exact or not.

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

Answer (Please click here to Add Answer)

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Question No : 42 of 52

Marks: 2 (Budgeted Time 4 Min)

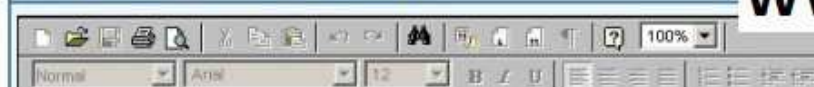
Evaluate

$$\int_{-\pi}^{\pi} \cos nx \, dx$$

where n is an integer other than zero.

Answer ([Please click here to Add Answer](#))

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Question No : 43 of 52

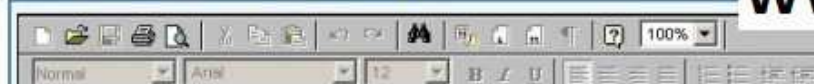
Marks: 2 (Budgeted Time 4 Min)

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

$$f(x) = x^2 - 4 \sin x$$

Answer ([Please click here to Add Answer](#))

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Question No : 44 of 52

Marks: 2 (Budgeted Time 4 Min)

Given $\vec{a} \times \vec{b} = 3xi + 2yj + xk$ and $\vec{c} = 7xi + 4yk$. Find scalar triple product of these vectors.Answer ([Please click here to Add Answer](#))

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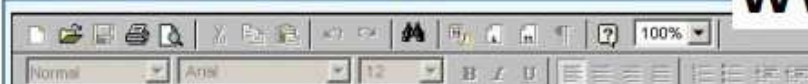
Question No : 45 of 52

Marks: 3 (Budgeted Time 6 Min)

What is the arc-length of the curve $\vec{r}(t) = (4+3t)\hat{i} + (2-2t)\hat{j} + (5+t)\hat{k}$ when $3 \leq t \leq 4$?

Answer ([Please click here to Add Answer](#))

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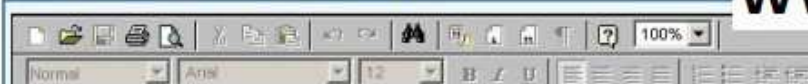
Question No : 46 of 52

Marks: 3 (Budgeted Time 6 Min)

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

Answer ([Please click here to Add Answer](#))

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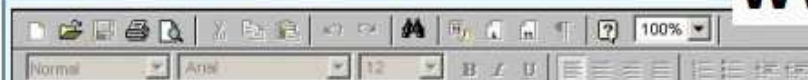
Question No : 47 of 52

Marks: 3 (Budgeted Time 6 Min)

Determine the Fourier co-efficient a_0 of the periodic function defined below:
 $f(x) = 2x+1 \quad 0 < x < 2$

Answer ([Please click here to Add Answer](#))

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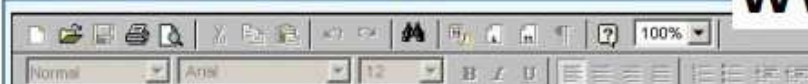
Question No : 48 of 52

Marks: 3 (Budgeted Time 6 Min)

A line, in three dimensional space, passes through the point $(3, -4, 2)$ and parallel to the vector $\vec{r} = 4\hat{i} + 3\hat{j} + 6\hat{k}$. Write down the equation of this line in parametric and symmetric form.

Answer ([Please click here to Add Answer](#))

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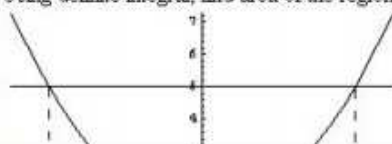


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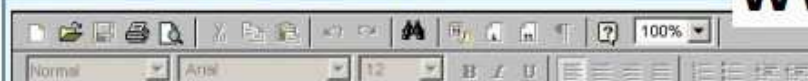
Question No : 49 of 52

Marks: 5 (Budgeted Time 10 Min)

Using definite integral, find area of the region bounded by the curves of $y = x^2 + 1$ and $y = 5$

Answer ([Please click here to Add Answer](#))

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Question No : 50 of 52

Marks: 5 (Budgeted Time 10 Min)

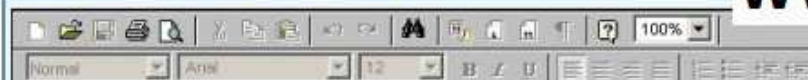
Show that Laplace transform of the function

$f(t) = 1$ is

$\frac{1}{s}$ where s is a constant for the integration and $s > 0$.

Answer ([Please click here to Add Answer](#))

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Question No : 51 of 52

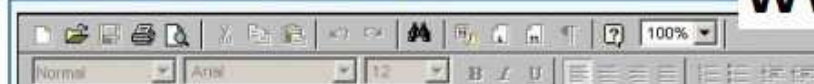
Marks: 5 (Budgeted Time 10 Min)

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

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

Answer ([Please click here to Add Answer](#))

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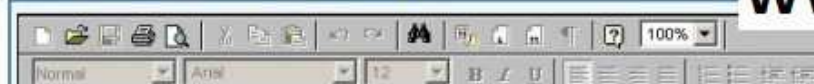
Question No : 52 of 52

Marks: 5 (Budgeted Time 10 Min)

Consider the point $(-5, 5, 6)$ in rectangular coordinate system. Convert it into Spherical coordinates.

Answer ([Please click here to Add Answer](#))

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