

Calculus II (MTH301)

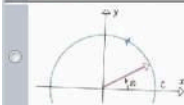
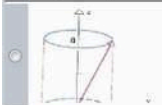
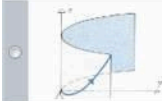
Question: 1 (Marks: 1)

Attempted Questions: 0 Total Questions: 52

Match the vector-valued function with its graph.

$$\mathbf{r}(t) = (a \cos t)\mathbf{i} + (a \sin t)\mathbf{j} + (ct)\mathbf{k} \quad \text{where } a \text{ and } c \text{ are positive constants and } 0 \leq t \leq 2\pi$$

Choices:



TIME LEFT
120



Calculus II (MTH301)

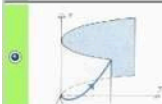
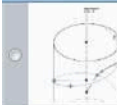
Question: 2 (Marks: 1)

Attempted Questions: 1 Total Questions: 52

Match the following vector-valued function with its graph.

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

Choices:



TIME LEFT
119



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

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

Choices:

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

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

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

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

TIME LEFT

119



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

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

Choices:

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

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

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

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

TIME LEFT

118



The following differential is exact

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

Choices:

True

False

TIME LEFT
116



The following differential is exact

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

Choices:

True

False

TIME LEFT
116



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

Choices:

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

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

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

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

TIME LEFT

115

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

Choices:

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

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

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

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

TIME LEFT

113

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

Choices:

☐ $\vec{F} = 0$

☐ $\text{grad } \vec{F} = 0$

☐ $\text{div } \vec{F} = 0$

☒ $\text{curl } \vec{F} = 0$

TIME LEFT

113



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

What is the amplitude of a periodic function defined by ?

Choices:

☐ 0

☐ 1

☒ $\frac{1}{3}$

☐ Does not exist

TIME LEFT

112



$$f(x) = \sin \frac{x}{2}$$

What is the period of a periodic function defined by ?

Choices:

☒ $\frac{\pi}{2}$

☐ π

☐ $\frac{3\pi}{2}$

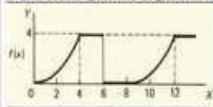
☐ 4π

TIME LEFT

111



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



Choices:

☐ 0

☒ 4

☐ 6

☐ 8

TIME LEFT

111



Next Question

Let L denotes the Laplace Transform.

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

Choices:

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

☐ $L\{t F(t)\} = f(s+t)$

☐ $L\{t F(t)\} = f(s)$

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

TIME LEFT

111



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

Choices:

☐ Even function

☐ Odd function

☒ Neither even nor odd

TIME LEFT

111



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

Choices:

☐ 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.

TIME LEFT

108

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

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

Choices:

☒ Zero

☐ One

☐ Infinite

TIME LEFT

108

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

Choices:

☒ $L\{e^{5t}\} = \frac{1}{s-5}$

☐ $L\{e^{5t}\} = \frac{s}{s^2+25}$

☐ $L\{e^{5t}\} = \frac{5}{s^2+25}$

☐ $L\{e^{5t}\} = \frac{5!}{s^5}$

TIME LEFT

107



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

Choices:

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

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

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

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

TIME LEFT

106



$$\int_C (xy) \, dx + y^2 \, dy$$

Evaluate the line integral where C is the line segment from (0, 0) to (0, 3).

Choices:

9



4



0



-4



TIME LEFT

103



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

Choices:

True



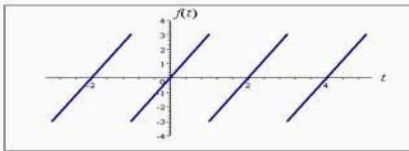
False



TIME LEFT

103





Choices:

☒ An odd function☐ An even function☐ Neither even nor odd

TIME LEFT

103



How many real numbers exist between two consecutive integers?

Choices:

☒ 0☐ 1☐ Infinite☐ None

TIME LEFT

102



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

Choices:

☐ Direction cosines

☐ Direction ratios

☒ Direction angles

TIME LEFT

102



If the spherical coordinates of a point are $\left(2, \frac{\pi}{4}, 0\right)$, then z-coordinate in rectangular coordinate system is

Choices:

☒ 0

☐ -2

☐ 2

☐ $\sqrt{2}$

TIME LEFT

101



The direction of gradient at any point on the surface is to the tangent plane at that point.

Choices:

☐ parallel☒ perpendicular☐ opposite direction☐ None of these.

TIME LEFT

100



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

Choices:

☐ Parallel☐ Perpendicular☐ In opposite direction☒ Overlapping

TIME LEFT

100



Let x, y, z be the length, width and height of an open rectangular box. The surface area of the box will be

Choices:

☒ $A = xy + 2yz + 2xz$

☐ $A = yz + 4$

☐ $A = xz + yz + zx$

☐ $A = xyz$

TIME LEFT

99



Double integral of a function $f(x, y)$ represents of the region between the surface defined by the function and the plane which contains its domain.

Choices:

☐ Perimeter☒ Volume☐ Area☐ Circumference

TIME LEFT

99



Calculus II (MTH301)

Question: 42 (Marks: 2)

Attempted Questions: 40 Total Questions: 52

Evaluate

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

where n is an integer other than zero.

Calculus II (MTH301)

Question: 43 (Marks: 2)

Attempted Questions: 40 Total Questions: 52

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

Calculus II (MTH301)

Question: 45 (Marks: 3)

Attempted Questions: 40 Total Questions: 52

Determine the fourier co-efficient a_0 , of periodic function defined by

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

Calculus II (MTH301)

Question: 46 (Marks: 3)

Attempted Questions: 40 Total Questions: 52

Find $\text{curl } \vec{F}$, if $\vec{F} = x^2\hat{i} + 4xy^3\hat{j} + y^3x\hat{k}$

Calculus II (MTH301)

Question: 48 (Marks: 3)

Attempted Questions: 40 Total Questions: 52

Find the limit, if (x, y) approaches to $(0, 0)$ along the line $y = x$

$$\lim_{(x, y) \rightarrow (0, 0)} \frac{4x^3y}{2x^4 + 3y^4}$$

Answer:

Calculus II (MTH301)

Question: 49 (Marks: 5)

Attempted Questions: 40 Total Questions: 52

Evaluate the line integral $\int_C (x-y) dx + x dy$ along $y^2 = x$ from the point $(4, -2)$ to the point $(4, 2)$

Calculus II (MTH301)

Question: 51 (Marks: 5)

Attempted Questions: 40 Total Questions: 52

Determine whether the following vector field $\vec{F}$ is conservative or not.
 $\vec{F}(x, y, z) = x^2z \hat{i} + y^2x \hat{j} + (y + 2z) \hat{k}$

Answer:

Calculus II (MTH301)

Question: 52 (Marks: 5)

Attempted Questions: 40 Total Questions: 52

Let $f(x, y) = x^2y - y^2$ where $x = t^2$ and $y = 2t$. Use chain rule to find $\frac{df}{dt}$ and express the answer in variable t only.

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

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

Choices:

☐ $\vec{r}(t)$ 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.

TIME LEFT

118

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

Choices:

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

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

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

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

TIME LEFT

115

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

Choices:

☐ 2☒ 4☐ 8☐ 16

TIME LEFT

113



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

Choices:

☐ 1☐ 3☒ 4☐ 12

TIME LEFT

112



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



Choices:

☒ π

☐ $-\pi$

☐ 2π

☐ -2π

TIME LEFT

111



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

Choices:

☐ x-axis

☒ y-axis

☐ origin

TIME LEFT

111



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

Choices:

☐ $L\{t\} = \frac{1}{s}$

☐ $L\{t\} = \frac{1}{s^2}$

☒ $L\{t\} = e^{-s}$

☐ $L\{t\} = s$

TIME LEFT

108

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

Choices:

☐ -4

☐ 0

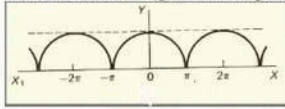
☒ 4

☐ Do not exist

TIME LEFT

104

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



Choices:

Even function



Odd function



Neither even nor odd function



TIME LEFT

103



The axis of symmetry of the parabola $y = -2x^2 + 4x + 1$ is

Choices:

$x = 2$



$x = -1$



$x = 4$



$x = 1$



TIME LEFT

102



The function $f(x, y) = \sqrt{y - x}$ is continuous in the region ----- and discontinuous elsewhere.

Choices:

☐ $x \neq y$ ☐ $x \leq y$ ☒ $x > y$ ☐ $x \geq y$

TIME LEFT

101



For a function to have a relative extremum at a point C, the point must be a

Choices:

☐ Saddle point☒ Critical point☐ Negative point☐ Stationary point

TIME LEFT

100



Calculus II (MTH301)

Question: 41 (Marks: 2)

Attempted Questions: 40 Total Questions: 52

Let the functions $P(x, y)$ and $Q(x, y)$ have continuous first partial derivatives inside and the boundary C of a region R in the xy -plane. State the condition when the line

$$\int_C (P dx + Q dy)$$

integral is independent of path.

Answer:



Calculus II (MTH301)

Question: 44 (Marks: 2)

Attempted Questions: 40 Total Questions: 52

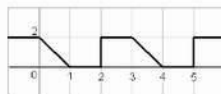
Find the domain of $f(x, y)$ where $f(x, y) = xe^{x^2+5xy+y^3}$

Calculus II (MTH301)

Question: 47 (Marks: 3)

Attempted Questions: 40 Total Questions: 52

Define the periodic function whose graph is shown below.



Calculus II (MTH301)

Question: 50 (Marks: 5)

Attempted Questions: 40 Total Questions: 52

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

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