Unit 1 - How to access the portal

Assignment 0

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2018-08-13, 23:59 IST.

1) Which of the following statement is not suitable for the matrix?

\[
A = \begin{bmatrix}
3 & -1 \\
3 & 4
\end{bmatrix}
\]

- Trace of the matrix A is 7.
- Determinant of the matrix A is 15.
- Matrix A is singular.
- Dimension of the matrix A is 2.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Matrix A is singular.

2) Given that \( I = \int_{1}^{2} \frac{1}{x(x+1)} \, dx \), then the value of I is:

- \( \ln \frac{1}{3} \)
- \( \ln \frac{4}{3} \)
- 0
- 1

No, the answer is incorrect.

Score: 0

Accepted Answers:

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The graph of \( h(x) \) is concave down in \( x \in [0, \frac{\pi}{2}] \).

The extreme values of \( h(x) \) will occur at the points where \( \cos(2x) = 0 \).

No, the answer is incorrect.
Score: 0
Accepted Answers:
- The graph of \( h(x) \) is concave down in \( x \in [0, \frac{\pi}{2}] \).

4) Which of the following function is monotonically increasing in the interval \( [0, \frac{\pi}{2}] \)?

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( f_1(x) = 1 - x )</td>
<td></td>
</tr>
<tr>
<td>( f_2(x) = \cos^2(x) )</td>
<td></td>
</tr>
<tr>
<td>( f_3(x) = \sin x )</td>
<td></td>
</tr>
<tr>
<td>( f_4(x) = (1 - x)^2 )</td>
<td></td>
</tr>
</tbody>
</table>

No, the answer is incorrect.
Score: 0
Accepted Answers:
- \( f_5(x) = \sin x \)

5) Which one of the following options represents a suitable mathematical model?

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water is flowing out from a tap.</td>
<td></td>
</tr>
<tr>
<td>( 2x + 1 = 5 )</td>
<td></td>
</tr>
<tr>
<td>The dimension of Jacob's laptop is 300mm X 200 mm X 10 mm.</td>
<td></td>
</tr>
<tr>
<td>For given length of perpendicular (P) and base (B) of right angled triangle, the length of hypotenuse (H) can be given as ( H^2 = P^2 + B^2 ).</td>
<td></td>
</tr>
</tbody>
</table>

No, the answer is incorrect.
Score: 0
Accepted Answers:
- For given length of perpendicular (P) and base (B) of right angled triangle, the length of hypotenuse (H) can be given as \( H^2 = P^2 + B^2 \).

6) Which of the following physical phenomena best represents a stable behavior?

<table>
<thead>
<tr>
<th>Phenomenon</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sliding a ball on a friction-less surface.</td>
<td></td>
</tr>
<tr>
<td>Movement of pendulum clock.</td>
<td></td>
</tr>
<tr>
<td>A plastic ball rotating inside a hemispherical shaped bowl.</td>
<td></td>
</tr>
<tr>
<td>An ice-land having 100 kg food, 1000 rats and 50 cats only at initial stage (assume reproduction is possible).</td>
<td></td>
</tr>
</tbody>
</table>

No, the answer is incorrect.
Score: 0
Accepted Answers:
- A plastic ball rotating inside a hemispherical shaped bowl.

7) There is an ice-land having only a single kind of species. Initially, there is only one pair of
species is present. Assume that sufficient amount of resources are available for their living and
reproducing new generations and the age of every species is 3 years. At the end of an year, each pair
produces a new pair, i.e. at the end of 1st, 2nd and 3rd years there will be total 2, 4 and 7 pairs
respectively. Mark the appropriate statement about this:

- At the end of 5 years, there will be a total of 20 pairs of species will be available on the
  ice-land.
- This hypothetical scene can be represented by mathematical statement but there is no
  specific pattern of numbers.
- Physically, this scene shows that after some time, however large, there will be no species
  present on this ice-land.
- At the end of 5 years, there will be a total of 24 pairs of species available on the ice-land.

No, the answer is incorrect.
Score: 0
Accepted Answers:
At the end of 5 years, there will be a total of 24 pairs of species available on the ice-land.

8) Mark the most in-appropriate statement: 3 points

- If \( f(x) = \frac{1}{1-x} \) then \( f(f(f(x))) = x \).
- There is an unique magnitude and direction of a vector.
- The graph of \( g(x) = x^3 \) is concave in nature throughout the domain.
- For the given matrix \( A \), if \( A = A^T \), where \( A^T \) represents transpose of matrix, then matrix \( A \) is
  symmetric in nature.

No, the answer is incorrect.
Score: 0
Accepted Answers:
The graph of \( g(x) = x^3 \) is concave in nature throughout the domain.

9) Mark the incorrect statement: 4 points

- \( g_1(x) = x \) is a monotonically increasing function.
- \( g_2(x) = \lfloor x \rfloor \), where \( \lfloor . \rfloor \) represents a greatest integer function, is increasing but not a
  monotonically increasing function.
- \( g_3(x) = x - \lfloor x \rfloor \), where \( \lfloor . \rfloor \) represents a greatest integer function, is a discontinuous and
  periodic function of fundamental period 2.
- \( g_4(x) = \tan(x) \) has discontinuities at \( x = n\pi \pm \frac{\pi}{2} \), where \( n \) is any integer.

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( g_3(x) = x - \lfloor x \rfloor \), where \( \lfloor . \rfloor \) represents a greatest integer function, is a discontinuous and periodic
function of fundamental period 2.

10) Let \( P(x) = ax^3 + bx^2 + cx + d \) is a polynomial of degree 3. Mark the in-correct statement about this polynomial: 4 points
The product of all 3 roots is $\frac{-d}{a}$.

All the 3 roots of $P(x)$ can not be complex numbers.

$P(x)$ will either have 1 real root or 2 real roots.

The graph of $P(x)$ will cut x-axis at-least once.

No, the answer is incorrect.

Score: 0

Accepted Answers:

$P(x)$ will either have 1 real root or 2 real roots.