

Sem1 Maths1

Question Number : 57 Question Id : 640653825634 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

Instructions:

- There are some questions which have functions with discrete valued domains (such as day, month, year etc).
- For NAT type question, enter only one right answer even if you get multiple answers for that particular question.
- Notations:
 - \mathbb{R} = Set of real numbers
 - \mathbb{Q} = Set of rational numbers
 - \mathbb{Z} = Set of integers
 - \mathbb{N} = Set of natural numbers
- The set of natural numbers includes 0.

Question Label : Comprehension

Suppose A is the set of even positive integers less than or equal to 20
and B is the set of positive integers less than 20 which are divisible by 6.

Consider the following relations from A to B .

- $R_1 = \{(a, b) \mid a \in A, b \in B, a \text{ is a factor of } b\}$
- $R_2 = \{(a, b) \mid a \in A, b \in B, (a + b) \bmod 10 = 0\}$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 58 Question Id : 640653825636 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

What is the cardinality of $R_1 \cap R_2$?

Response Type : Numeric

Possible Answers :

1

Question Number : 59 Question Id : 640653825637 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What is the cardinality of R_1 ?

Response Type : Numeric

Possible Answers :

9

Question Number : 60 Question Id : 640653825638 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements are correct?

Options :

- ✓ R_1 is transitive.
- ✗ R_2 is transitive.
- ✓ R_2 is not symmetric.
- ✓ $(2, 18)$ is an element in R_2 .

Question Numbers : (61 to 62)

Question Label : Comprehension

Suppose that P_1 and P_2 are two different points in a Cartesian coordinate system, with P_1 located at $(3, -2)$ and P_2 at $(-1, 5)$. Let L_1 and L_2 be lines passing through P_1 and P_2 respectively.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 61 Question Id : 640653825641 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

If the x -intercept of the line L_1 is 1 and the angle between L_1 and L_2 is $\frac{\pi}{2}$ then

Determine the coordinates of the point where L_1 and L_2 intersect.

Options :

- ✗ $(\frac{5}{2}, \frac{7}{2})$
- ✗ $(5, 11)$
- ✗ $(-5, 7)$
- ✓ $(-\frac{5}{2}, \frac{7}{2})$


Question Number : 62 Question Id : 640653825642 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

If the x -intercept of the line L_1 is 1 and y - intercept of the line L_2 is -1 and If θ is the angle between L_1 and L_2 , then $\tan \theta$ is equal to

Options :

 $\frac{-5}{7}$

 $\frac{5}{7}$

 $\frac{5}{3}$

 $\frac{4}{7}$

Question Number : 63 Question Id : 640653825639 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

A company opened recruitment for the post of data analyst. 500 candidates have applied for the post. 285 candidates are proficient in Python programming, 195 candidates are proficient in C programming, 115 candidates are proficient in Java programming, 45 candidates are proficient in Python and Java, 70 candidates are proficient in C and Python, 50 candidates are proficient in C and Java and 50 candidates don't know any of the programming languages. Find the number of candidates who are proficient in exactly one of the three programming languages.

Response Type : Numeric

325

Question Number : 64 Question Id : 640653825643 Question Type : SA

Correct Marks : 4

Question Label : Short Answer Question

Radhika has been tracking her monthly expenses and the corresponding number of outings she has with friends. Here's a table with two rows representing the amount spent on entertainment and the corresponding number of outings. Let's consider y to be the amount spent and x to be the corresponding number of outings. She fitted a best fit line to her data and obtained the equation $y = 4x + 15$. What is the value of SSE (Sum of Squared Errors) in relation to the best fit line?

Amount spent	37	44	53	50	57	64
Number of outings	5	7	9	8	10	12

Response Type : Numeric

Possible Answers :

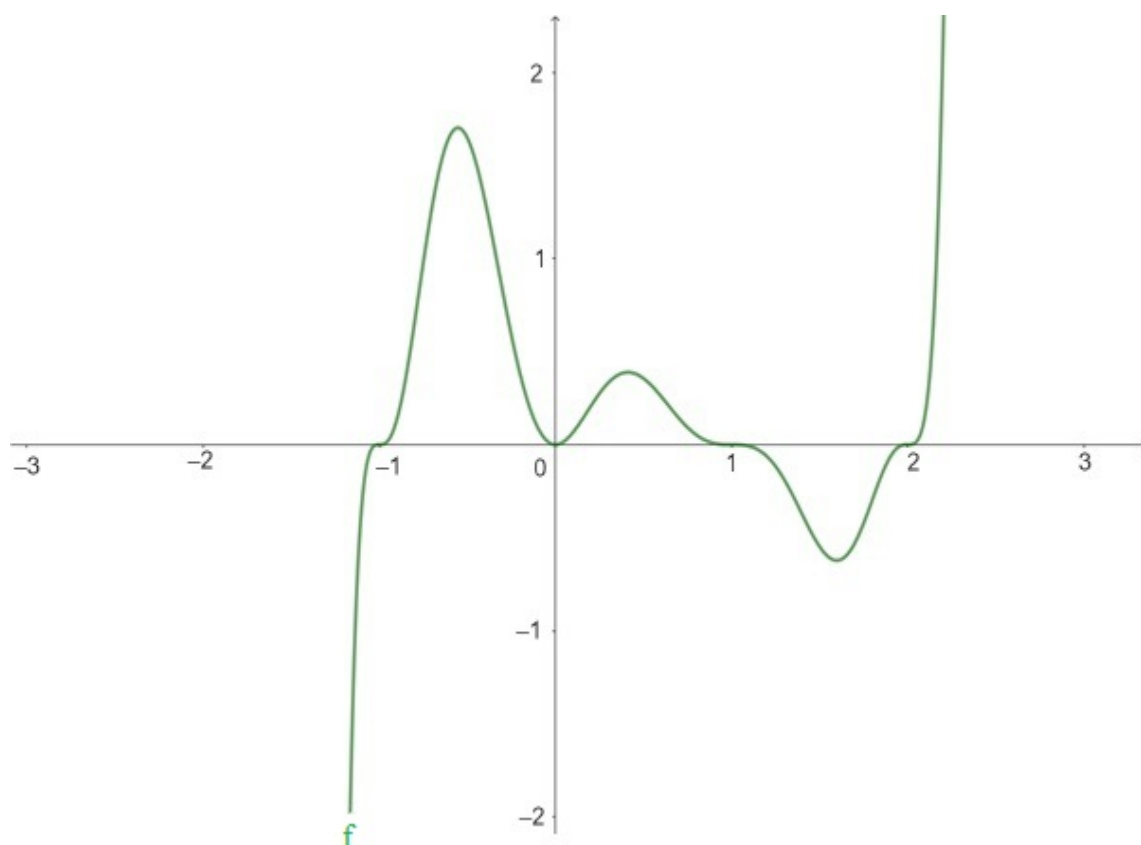
23

Question Number : 65 Question Id : 640653825644 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following polynomial $p(x)$ whose graph is given below:-



Which of the following options is/are correct?

Options :

- ☐ Multiplicity of -1 and 1 must be the same.
- ☒ $p(x)$ is an increasing function in the interval $(2, \infty)$.
- ☒ $p(x)$ tends to infinity as x tends to infinity.
- ☐ The number of turning points is 5.

Question Number : 66 Question Id : 640653825645 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the parabola $y = x^2 + 4x + 12$. Which of the following option(s) are true?

Options :

- ☐ The co-ordinates of vertex is $(-8, 2)$.
- ☒ The given equation attains its minima at $x = -2$.
- ☒ y-intercept of parabola is 12.
- ☒ The minimum value for the given equation is 8

Question Number : 67 Question Id : 640653825647 Question Type : MSQ

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the polynomials $p(x) = (2x - 1)(x - 5)q(x)$ where the zeros of $p(x)$ with multiplicity 1 are $\frac{1}{2}, 5, 2, \frac{3}{5}$. Which of the following option(s) are true for $q(x)$?

Options :

- ☐ $q(x)$ is a cubic polynomial.
- ☒ $q(x)$ is a quadratic polynomial.
- ☒ $q(x)$ has two distinct zeros.
- ☐ $q(x)$ does not have any real zeros.

Question Number : 68 Question Id : 640653825646 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the quadratic equation $ax^2 + bx + c = 0$ where a, b, c are integers with $a \neq 0$. Which of the following option(s) are true?

Options :

- ✔ If $b^2 - 4ac > 0$ and a perfect square then there exists a rational root of the quadratic equation.
- ✘ If $b^2 - 4ac > 0$ and not a perfect square then there exists a rational root of the quadratic equation.
- ✘ If $b^2 - 4ac < 0$ and a perfect square then there exists a rational root of the quadratic equation.
- ✘ If $b^2 - 4ac < 0$ and not a perfect square then there exists a rational root of the quadratic equation.