Aptitude Assignment 3

1. Write two quadratic equations such that the sum of roots equals twice the product of roots?

Answer:

Quadratic equations such that the sum of roots equals twice the product of roots:
Let's consider the quadratic equation in the form of $ax^2 + bx + c = 0$.
To satisfy the given condition, the sum of roots should be equal to twice the product of roots.

Let the roots of the quadratic equation be α and β.

The sum of roots is $\alpha + \beta$, and the product of roots is $\alpha\beta$.

According to the given condition, we have:
$\alpha + \beta = 2\alpha\beta$

Here are two quadratic equations that satisfy the given condition:

$x^2 - 4x + 3 = 0$
The roots of this equation are 1 and 3.
Sum of roots: 1 + 3 = 4
Product of roots: 1 * 3 = 3
Sum of roots = 2 * Product of roots

$x^2 - 6x + 8 = 0$
The roots of this equation are 2 and 4.
Sum of roots: 2 + 4 = 6
Product of roots: 2 * 4 = 8
Sum of roots = 2 * Product of roots

2. $2x+3y=12$ has (2,3) as its solution or not?

Answer:

Checking if (2, 3) is a solution to the equation $2x + 3y = 12$:
Substituting $x = 2$ and $y = 3$ into the equation:
$2(2) + 3(3) = 4 + 9 = 13$

Therefore, (2, 3) is not a solution to the equation $2x + 3y = 12$.

3. Find possible coordinates of (x,y) such that point (1,1), (2,2) & (x,y) are collinear?

Answer:

Possible coordinates (x, y) such that (1, 1), (2, 2), and (x, y) are collinear: If three points are collinear, the slope between any two points should be the same.
Using the formula for the slope between two points (x1, y1) and (x2, y2):
slope = (y2 - y1) / (x2 - x1)
Let's find the slope between (1, 1) and (2, 2):
slope = (2 - 1) / (2 - 1) = 1/1 = 1
Therefore, for any point (x, y) to be collinear with (1, 1) and (2, 2), the slope between (2, 2) and (x, y) should also be 1.
Slope between (2, 2) and (x, y) = (y - 2) / (x - 2)
For collinearity, (y - 2) / (x - 2) = 1
Simplifying, we get y = x
So, any point (x, x) where x is a real number would satisfy the condition.

4. Find out all possible values of a & b for which the ratio of a^3+b^3 to a^3-b^3 is 1:1 a,b are real numbers.

Answer:

Possible values of a and b for the ratio of a^3 + b^3 to a^3 - b^3 being 1:1: Given ratio: a^3 + b^3 : a^3 - b^3 = 1 : 1
We can write this as:
(a^3 + b^3) / (a^3 - b^3) = 1
Using the identity a^3 + b^3 = (a + b)(a^2 - ab + b^2) and a^3 - b^3 = (a - b)(a^2 + ab + b^2), we have:
[(a + b)(a^2 - ab + b^2)] / [(a - b)(a^2 + ab + b^2)] = 1
Since we want the ratio to be 1:1, the numerator and denominator should be equal.
a + b = a - b
2b = 0
b = 0
Substituting b = 0 in the equation, we have:
(a + 0)(a^2 - a(0) + 0^2) / (a - 0)(a^2 + a(0) + 0^2) = 1
a^3 / a^3 = 1
Therefore, any real value of a would satisfy the given condition.

5. The triangle area formed by the lines y=x, y-axis and y=3 line will be?

Answer:

Triangle area formed by the lines y = x, y-axis, and y = 3:
To find the area of the triangle, we need the base and height of the triangle.
The base of the triangle is the distance between the y-axis and the point where the line y = 3 intersects the x-axis.

To find the intersection point, we set y = 3 and solve for x:
3 = x

So, the x-coordinate of the intersection point is 3.

The height of the triangle is the distance between the point (3, 3) and the line y = x.

To find the distance between a point (x1, y1) and a line Ax + By + C = 0, we use the formula:

Distance = |Ax1 + By1 + C| / √(A^2 + B^2)

For the line y = x, A = -1, B = 1, and C = 0. Plugging in the values, we get:

Distance = |-x1 + y1| / √((-1)^2 + 1^2) = |-(3) + (3)| / √(2) = 0 / √(2) = 0

Therefore, the height of the triangle is 0.

The area of a triangle is given by (1/2) * base * height.

In this case, the height is 0, so the area of the triangle is 0.