Q1-ANS

Let’s consider two quadratic equations with the form ax^2 + bx + c = 0 and dx^2 + ex + f = 0.

The sum of the roots of a quadratic equation is given by the formula:
Sum of Roots = -b/a.

The product of the roots of a quadratic equation is given by the formula:
Product of Roots = c/a.

We want the sum of the roots to be equal to twice the product of the roots, so we can set up the following equation:

Sum of Roots = 2 * Product of Roots

Substituting the formulas, we get:

-b/a = 2 * (c/a)

Simplifying further, we have:

-b = 2c

Now, let’s consider two quadratic equations that satisfy this condition:

Equation 1: x^2 + 3x + 2 = 0
Equation 2: 2x^2 + 6x + 4 = 0

For Equation 1:
Sum of Roots = -3/1 = -3
Product of Roots = 2/1 = 2
Twice the Product of Roots = 2 * 2 = 4

For Equation 2:
Sum of Roots = -6/2 = -3
Product of Roots = 4/2 = 2
Twice the Product of Roots = 2 * 2 = 4

As we can see, the sum of the roots for both equations is equal to twice the product of the roots, satisfyin g the given condition.

Q2-ANS

To determine if (2, 3) is a solution to the equation 2x + 3y = 12, we can substitute the values of x and y int o the equation and check if it holds true.

Let’s substitute x = 2 and y = 3 into the equation:

2(2) + 3(3) = 4 + 9 = 13

The equation evaluates to 13, not 12. Therefore, (2, 3) is not a solution to the equation $2x + 3y = 12$.

Q3-ANS

To determine the possible coordinates (x, y) such that the points (1, 1), (2, 2), and (x, y) are collinear, we can use the concept of slope.

If three points are collinear, the slopes between any pair of points should be equal.

The slope between two points (x1, y1) and (x2, y2) is given by:
slope = (y2 - y1) / (x2 - x1)

In this case, we have the points (1, 1), (2, 2), and (x, y). The slopes between these points are:

slope1 = (2 - 1) / (2 - 1) = 1 / 1 = 1

slope2 = (y - 1) / (x - 1)

Since the points (1, 1), (2, 2), and (x, y) are collinear, the slopes should be equal. Therefore, we can set u p the equation:

slope1 = slope2

1 = (y - 1) / (x - 1)

To find the possible coordinates (x, y), we need to solve this equation. Let’s simplify it:

(x - 1) = (y - 1)

x = y

Now, we have the relationship x = y. This means that for any value of x, y should be the same in order for the three points to be collinear.

Therefore, the possible coordinates (x, y) that satisfy this condition are:

(x, x)

For example, (1, 1), (2, 2), and (3, 3) are collinear points because they follow the pattern x = y.

Q4-ANS

To find the possible values of a and b for which the ratio of $a^3 + b^3$ to $a^3 - b^3$ is 1:1, we can set up the equation:

$$(a^3 + b^3) / (a^3 - b^3) = 1/1$$

First, let’s simplify the left side of the equation:

$$(a^3 + b^3) / (a^3 - b^3) = 1$$

Multiply both sides by $(a^3 - b^3)$ to eliminate the denominator:

$$(a^3 + b^3) = a^3 - b^3$$

Expand the left side using the sum of cubes formula:

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

Substitute the formula into the equation:

$$(a + b)(a^2 - ab + b^2) = a^3 - b^3$$

Since a and b are real numbers, we can divide both sides by $(a + b)$ without any issues:

$$a^2 - ab + b^2 = a^2 + ab + b^2$$

Now, let’s simplify the equation:

$$-2ab = 2ab$$

Add $2ab$ to both sides:

$$4ab = 0$$

Divide both sides by 4:

$$ab = 0$$

So, the product of a and b must be zero ($ab = 0$) for the ratio of $a^3 + b^3$ to $a^3 - b^3$ to be 1:1.

This means that one of the values, a or b, must be zero. Therefore, the possible values for a and b are:

$a = 0$, b is any real number
$b = 0$, a is any real number

In summary, the possible values of a and b for which the ratio of $a^3 + b^3$ to $a^3 - b^3$ is 1:1 are when one of them is zero, and the other can be any real number.

Q5-ANS

To find the area of the triangle formed by the lines y = x, the y-axis, and y = 3, we can use the formula for the area of a triangle.

First, let's determine the coordinates of the vertices of the triangle.

The lines y = x and y = 3 intersect when x = 3, since y = 3 for both lines at that point. So one vertex of the triangle is (3, 3).

The lines y = x and the y-axis intersect at the origin (0, 0). Therefore, another vertex of the triangle is (0, 0).

Finally, the lines y = 3 and the y-axis intersect at (0, 3). Thus, the third vertex of the triangle is (0, 3).

Now, we can calculate the area of the triangle using the coordinates of the vertices.

Let's consider the base of the triangle as the line segment connecting (0, 0) and (0, 3). The length of this base is 3 units.

The height of the triangle is the perpendicular distance from the vertex (3, 3) to the base. The height is the difference in y-coordinates between (3, 3) and any point on the base, which is 3 units.

Therefore, the area of the triangle is given by:

Area = (base * height) / 2 = (3 * 3) / 2 = 9 / 2 = 4.5 square units.

So, the area of the triangle formed by the lines y = x, the y-axis, and y = 3 is 4.5 square units.