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**COMSATS University, Islamabad**

**Assignment # 1**

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**Course: Mathematics (MTH-100)**

**Instructor: Dr. Amna Nazeer**

**Date: March 21, 2022**

**Question # 1**

Solve for x in the following problems

**Solution**

1. 7 + |2x – 5| = 4

The absolute number can never be negative, so there is no solution.

1. - |- 8 – 2x| = -12

Therefore, the solution set is:

1. x2 - 8x + 13 = 0

For this question, we use quadratic formula:

Here a = 1, b = -8, c = 13

Therefore, the solution set is:

Taking ‘2’ common,

Therefore, the solution set is

**Question # 2**

Solve for x and write the solution in interval notation. Show the solution graphically on number line.

**Solution**

Check if x < -1:

Check if x > -1:

Check if x = -1:

In interval notation,

In line number,



Check if x < -3.75 & x > 4.75:

Check if :

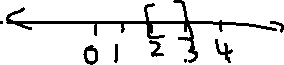
Solution set = [-3.75, 4.75]



Therefore,



Change into quadratic form,



Check if x = 0:

Check if x < 0:

Check if :

**Question # 3**

Derive the quadratic formula to find the roots of quadratic equation.

**Solution**

Divide by a,

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**Assignment # 2**

**Authors: Muhammad Mujtaba SP22-BSE-036 1A**

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**Course: Mathematics (MTH-100)**

**Instructor: Dr. Amna Nazeer**

**Date: March 21, 2022**

**Question # 1**

Which of the points P(1,-2) or Q(8,9) is closer to the point A(5,3)?

**Solution**

We have three vectors , and . We want to know whether or is closer to .

Distance from to is:

Distance from to is:

From above two calculations, it is clear that:

* Distance from to is *smaller*, hence it is closer to .

**Question # 2**

Show that the quadrilateral with vertices P(1,2), Q(4,4), R(5,9), and S(2,7) is a parallelogram by proving that its two diagonals bisect each other. (Show the quadrilateral on the coordinate plane).

**Solution**

To prove this, we need to find the mid-point of its diagonals. If mid-points are equal, it means that the two diagonals bisect each other.



Mid-point of any line is:

Where x1 and x2 are initial and

Final points respectively. Same case with

Y1 and y2.

Mid-point of is:

Mid-point of is:

* Comparing (1) and (2), it is proved that it is a parallelogram.

**Question # 3**

Sketch the graph of the equations y = x2 – 2 and y = |x| for -3 x 3

**Solution**

1. Graph for y = x2 – 2 (in range -3 x 3) is:



1. Graph for y = |x| (in range -3 x 3) is:



**Question # 4**

Write the equation of the line in slope-intercept form (y = mx + b). Identify slope and y-intercept of the line.

1. 8x − 9y = 0
2. 9x − 3y + 15 = 0

**Solution**

1. Slope-intercept form of 8x − 9y = 0:

Here, the slope is and y-intercept is 0, i.e. (0, 0).

1. Slope-intercept form of 9x − 3y + 15 = 0:

Here, the slope is and y-intercept is 5, i.e. (0, 5).

**Question # 5**

Find an equation of the line through the points (-1,2) and (3,-4) using point-slope form of the equation.

**Solution**

The point-slope form of the equation is:

So,

We can also write this in the form :

**Question # 6**

Find an equation of the line that is perpendicular to the line 4x + 6y + 5 = 0 and passes through the origin.

**Solution**

* The slope m of parallel lines is equal.
* The slope m of perpendicular lines have *their* product = -1

For line 4x + 6y + 5 = 0:

So the slope of given line is:

The slope of perpendicular line is such that, when multiplied by this slope, yields -1:

So,

The line must have y-intercept = (0, 0) in order for it to be passing through the origin. Therefore,

From the above discussion, we are synthesizing the equation for the perpendicular line:

Or,