

MTH 070

Analytic Geometry

Please provide justification for each answer in paragraph form using complete sentences. Show all work required for each problem.

Besides the concepts we have studied for this unit in class, there are a number of other ideas that we have not covered. One of these is what is called the distance formula.

The **distance formula** is based on the Pythagorean Theorem. It states that given any two points (x_1, y_1) and (x_2, y_2) , the distance, d , between these points is given by the formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Part 1

(10 points)

Throughout this problem you should round any decimals to five places.

Draw the following lines on graph paper and indicate their points of intersection.

$$y = -\frac{1}{2}x - 4$$

$$y = \frac{4}{5}x + 1$$

and $y = -5x + 7$

Part 2

(20 points)

You should now have a triangle formed by the intersection of the three lines.

Find the area of the triangle using two methods.

Method 1: $A = \frac{1}{2}bh$

Remember that the base and height of the triangle must be perpendicular to each other. This requires that you choose a base and find a line perpendicular to it that passes through the opposite vertex.

Method 2: Heron's Formula

$$A = \sqrt{s(s-a)(s-b)(s-c)}$$

where $s = \frac{a+b+c}{2}$ and a , b , and c are the three sides of the triangle.

AS YOUR LAST STEP IN BOTH METHODS, ROUND YOUR ANSWER TO THE NEAREST WHOLE NUMBER.

See the next page for an extra credit problem.

Extra Credit

Given the line $y = mx$ with $m > 0$, and the line $y = -mx + b$, with an x -intercept of $(n,0)$:

- a) Find the value of b .
- b) Find the point of intersection of the two lines by setting the equations for the lines equal to each other.
- c) Find area of the triangle with vertices at $(0,0)$, $(n,0)$ and the point of intersection.