

General Algebra 2 Worksheet #7 Unit 9 Selected Solutions

Use an appropriate second degree function to solve each of the following problems. Show your work neatly organized.

4. One number is five less than two times another. The sum of their squares is a minimum. What are the numbers?

first: x

second: $2x - 5$

$$S = f(x) = x^2 + (2x - 5)^2$$

$$S = f(x) = x^2 + 4x^2 - 20x + 25$$

$$S = f(x) = 5x^2 - 20x + 25$$

Notice that this function represents a parabola opening upward. Therefore, the vertex corresponds to a minimum sum. I have shown two methods for finding the vertex.

At the vertex, $x = -B/2A$

$$x = 20/10 = 2$$

The minimum sum is $f(2)$

$$f(2) = 5(2)^2 - 20(2) + 25 = 5$$

$$S - 25 = 5(x^2 - 4x \quad)$$

$$S - 25 + 20 = 5(x^2 - 4x + 4)$$

$$S - 5 = 5(x - 2)^2$$

$$\text{Vertex: } (2, 5) \quad x = 2$$

$x \quad S$

If $x = 2$, (The first number is 2.) then $2x - 5 = -1$. (The second number is -1.)

The numbers are 2 and -1. (The minimum sum is 5.)