**First Day Activity**

**Problem 1.** Consider the point $(1, 3)$ in the $x,y$-plane and the line

$$y = -2x - 5.$$  

Consider this: what point on this line is closest to the point $(1, 3)$, and what is its distance?

This problem may seem unusual, and it’s likely you’ve not seen one exactly like this before. Here are some hints and questions that might help you in approaching it:

- Draw a picture of the situation.
- Does there exists a single point on the line closest to $(1, 3)$? Are there many closest points? Are there no closest points?
- If there is a closest point, draw the segment connecting this point to $(1, 3)$. What is the geometric relationship between this segment and the line?
- How can you use this information?

If you finish this problem, here’s another one to try.

**Problem 2.** Consider the point $(5, -1)$ in the $x,y$-plane and the parabola

$$y = x^2.$$  

What point on the parabola is closest to the point $(5, -1)$, and what is its distance?

Some hints and questions:

- Draw a picture of the situation.
- How has the situation changed from the first problem?
- Can you use your approach to the previous problem here?
- What information has changed here? Does your previous approach give a result? Do you have to modify your approach somehow?