Mathematics 1275/D514 **Takehome Quiz #7**
Instructor: Suman Ganguli **Due: Wednesday, May 10** **Name:** ______________________

Solve the system of equations according to the following steps:

$$x^2 - y = 3 \quad (1)$$
$$2x + y = 5 \quad (2)$$

1. Use the addition method to reduce the system to a single equation involving only x.
   (Hint: You can eliminate y by adding equations (1) and (2), resulting in a quadratic equation in x.)

   Solution: Adding equations (1) and (2) yields $x^2 + 2x = 8$, i.e., the quadratic equation $x^2 + 2x - 8 = 0$.

2. Show that you get the same quadratic equation in x by using the substitution method (i.e., use either equation to solve for y in terms of x, and then substitute for y into the other equation).

   Solution: Solving for y from equation (2) yields $y = 5 - 2x$. So we substitute $5 - 2x$ for y in equation (1):

   $$x^2 - (5 - 2x) = 3 \Longrightarrow x^2 + 2x - 8 = 0$$

3. Solve the quadratic equation from parts (a) and (b) for x. (You can solve by factoring or by using the quadratic equation. You should get two integer solutions for x.)

   Solution: Since $x^2 + 2x - 8 = (x + 4)(x - 2)$, the two solutions of $x^2 + 2x - 8 = 0$ are $x = -4$ and $x = 2$.

4. For each of the x-values, solve for the corresponding values of y. (Use either of the original equations (1) or (2); in particular, in #2 you should have solved for y in terms of x–use that!)

   Solution: Using $y = 5 - 2x$ from #2 (which was derived from equation (2)):

   $$x = -4 \Longrightarrow y = 5 - 2(-4) = 13$$

   $$x = 2 \Longrightarrow y = 5 - 2(2) = 1$$

   So the solutions to the system of equations are $(-4, 13)$ and $(2, 1)$.