Section 5.1 – Practice Problems

Determine if the given ordered pair is a solution to the non-linear system.

1. $2x^2 - 3y = 2$ $(2, 2)$

   $x - 2y = -2$

$2(2)^2 - 3(2) = 2$
$2(4) - 6 = 2$
$8 - 6 = 2$
$2 = 2$ ✓

$2 - 2(2) = -2$
$2 - 4 = -2$
$-2 = -2$ ✓

YES IT IS

2. $2x^2 - 3y = 2$ $(-1.25, 0.375)$

   $x - 2y = -2$

$2(-1.25)^2 - 3(0.375) = 2$
$3.125 - 1.125 = 2$
$2 = 2$ ✓

$-1.25 - 2(0.375) = -2$
$-2 = -2$ ✓

YES IT IS

3. $x^2 + 2y = -2$ $(-2, -3)$

   $-2x + y = 2$

$(-2)^2 + 2(-3) = -2$
$4 - 6 = -2$
$-2 = -2$ ✓

$-2(-2) + (-3) = 2$
$4 - 3 = 2$
$1 = 2$ ×

NO IT IS NOT

4. $y = x^2 + 2x - 1$ $(-3, 2)$

   $y = x^2 + 4x + 5$

$2 = (-3)^2 + 2(-3) - 1$
$2 = 9 - 6 - 1$
$2 = 2$ ✓

$2 = (-3)^2 + 4(-3) + 5$
$2 = 9 - 12 + 5$
$2 = 2$ ✓

YES IT IS

5. $y = x^2 - 3x - 2$ $(-\frac{3}{5}, \frac{4}{25})$

   $y = x^2 + 2x + 1$

$\frac{4}{25} = (-\frac{3}{5})^2 - 3(-\frac{3}{5}) - 2$
$\frac{4}{25} = \frac{9}{25} + \frac{9}{5} - 2$
$\frac{4}{25} = \frac{9}{25} + \frac{45}{25} - \frac{50}{25}$
$\frac{4}{25} = \frac{4}{25}$ ✓

$\frac{4}{25} = (-\frac{3}{5})^2 + 2(-\frac{3}{5}) + 1$
$\frac{4}{25} = \frac{9}{25} - \frac{6}{5} + \frac{25}{25}$
$\frac{4}{25} = \frac{9 - 30 + 25}{25}$
$\frac{4}{25} = \frac{4}{25}$ ✓

YES IT IS

6. $y = x^2 - 3x - 4$ $(3, -4)$

   $y = -x^2 - 13$

$-4 = 3^2 - 3(3) - 4$
$-4 = 9 - 9 - 4$
$-4 = -4$ ✓

$-4 = -(3)^2 - 13$
$-4 = -9 - 13$
$-4 = -22$ ×

NO IT IS NOT

Determine all possible values for k, so that the graph of the equation contains the given point

7. $y = 2(x-k)^2 + 7$; $(3, 57)$

$57 = 2(3-k)^2 + 7$

$50 = 2(3-k)^2$

$25 = (3-k)^2$

$\pm 5 = 3-k$

$k = 3 \pm 5$

$\boxed{k = 8 \text{ or } -2}$

8. $y = -3(x-k)^2 + 6$; $(2, -42)$

$-42 = -3(2-k)^2 + 6$

$-48 = -3(2-k)^2$

$16 = (2-k)^2$

$\pm 4 = 2-k$

$k = 2 \pm 4$

$\boxed{k = 6 \text{ or } -2}$

9. $y = -\frac{1}{2}(x-k)^2 + 8$; $(-1, -10)$

$-10 = -\frac{1}{2}(-1-k)^2 + 8$

$-18 = -\frac{1}{2}(-1-k)^2$

$36 = (-1-k)^2$

$\pm 6 = -1-k$

$k = -1 \pm 6$

$\boxed{k = -7 \text{ or } 5}$

10. $y = \frac{1}{3}(x-k)^2 - 4$; $(-2, 71)$

$71 = \frac{1}{3}(-2-k)^2 - 4$

$75 = \frac{1}{3}(-2-k)^2$

$225 = (-2-k)^2$

$\pm 15 = -2-k$

$k = -2 \pm 15$

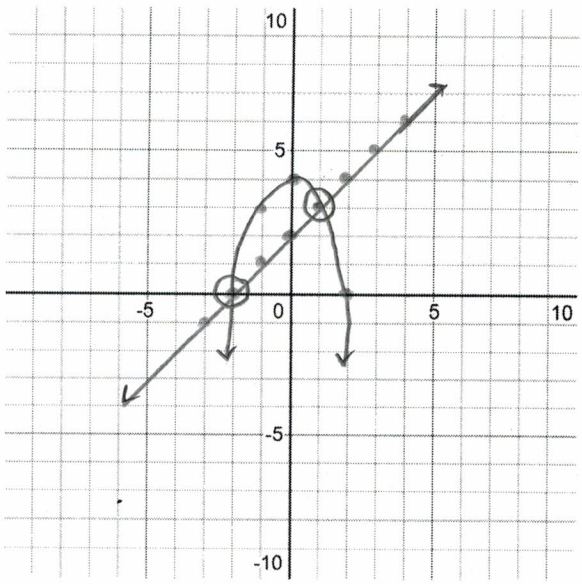
$\boxed{k = -17 \text{ or } 13}$

Solve the System by Graphing

11. $y = 4 - x^2 \longrightarrow y = -(x^2 - 4)$

$y = x + 2$

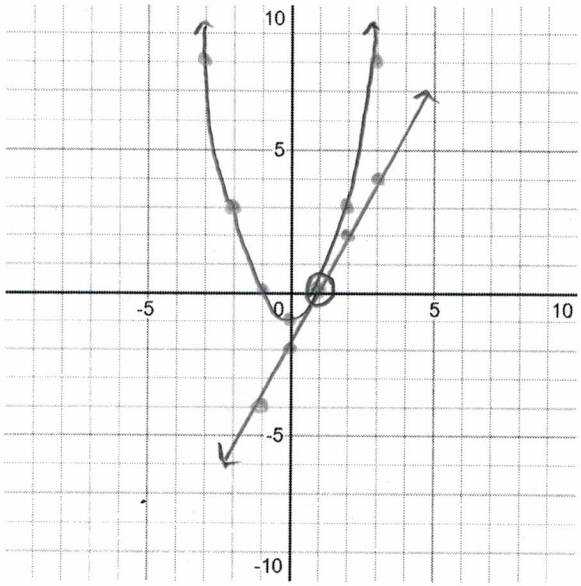
$\boxed{\text{Sol'n at: } (-2, 0) \text{ and } (1, 3)}$



12. $y = x^2 - 1$

$y = 2x - 2$

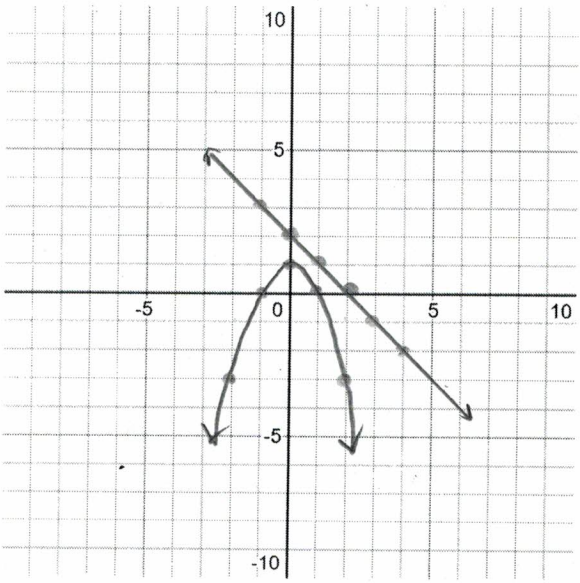
Solution at: (1,0)



13. $y = -x^2 + 1$

$x + y = 2$

No point of intersection

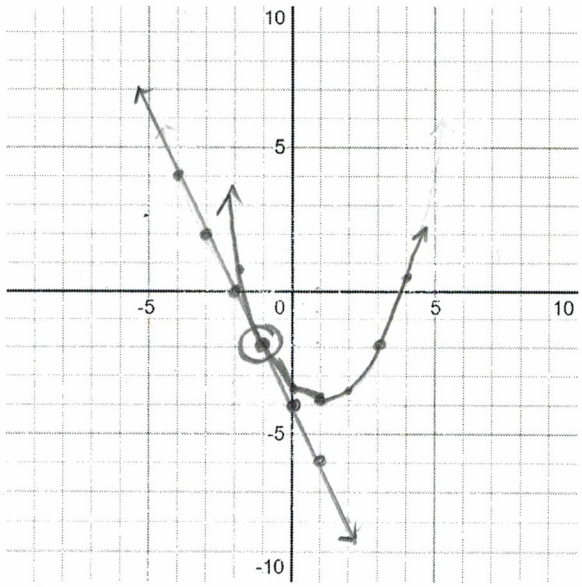


14. $y = \frac{1}{2}(x-1)^2 - 4$

$2x + y = -4$

$y = -2x - 4$

Solution at: $(-1, -2)$



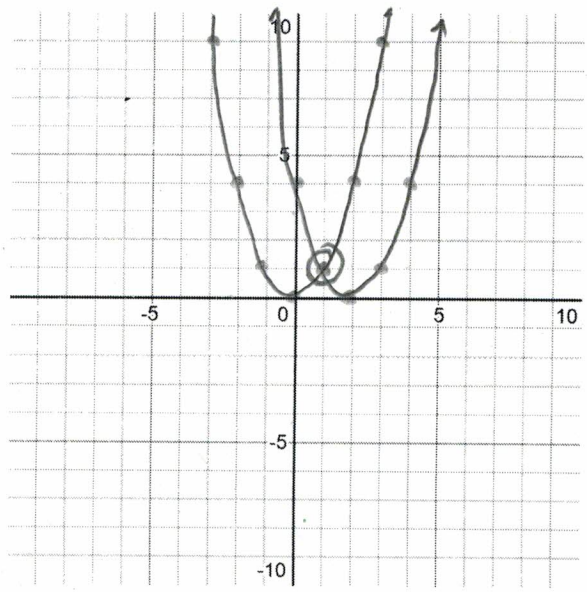
Solve the following systems by graphing

15. $y = x^2 - 4x + 4$

$y = x^2$

$(x-2)^2$

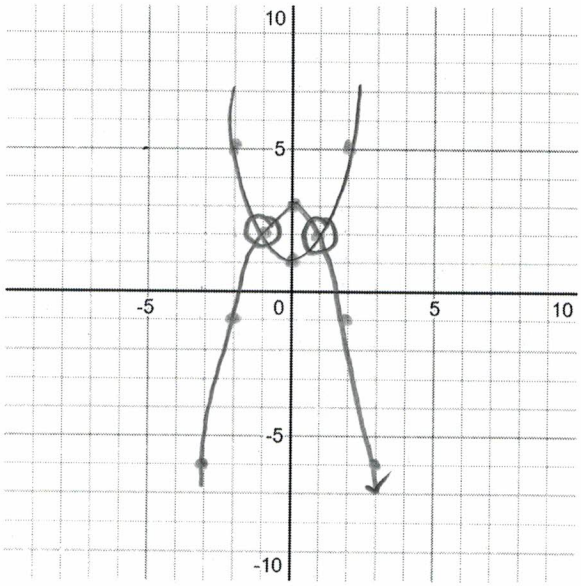
solution at: $(1, 1)$



16. $y = -x^2 + 3$

$y = x^2 + 1$

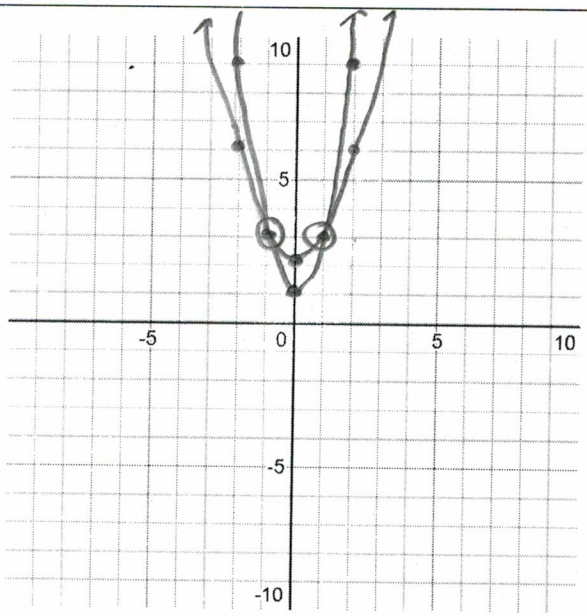
solutions at: (1,2) and (−1,2)



17. $y = x^2 + 2$

$y = 2x^2 + 1$

solutions at: (1,3) and (−1,3)



18. $y = 3x^2 + x - 4$

$y = 3x^2 - 8x + 5$

$(3x-5)(x-1)$

$5/3 \quad 1$

$y = 3(x^2 + \frac{x}{3}) - 4$

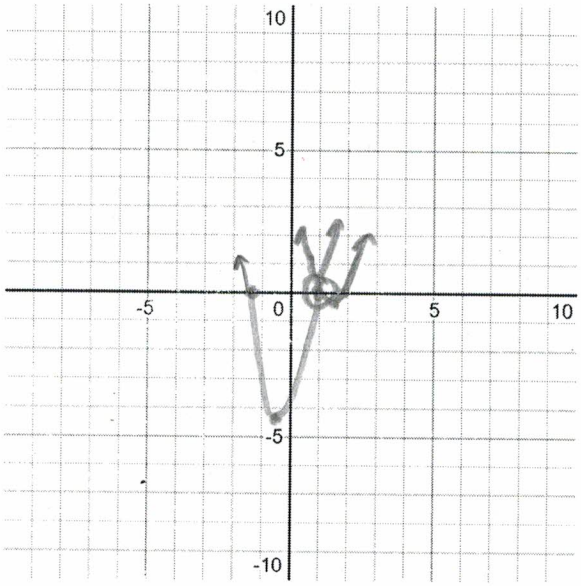
$3(x^2 + \frac{x}{3} + \frac{1}{36} - \frac{1}{36}) - 4$

$3(x + \frac{1}{6})^2 - \frac{1}{12} - 4$

vertex: $(-\frac{1}{6}, -4\frac{1}{12})$

Roots: $(3x+4)(x-1)$

$-4/3 \quad 1$



Intersection at $\boxed{(1,0)}$

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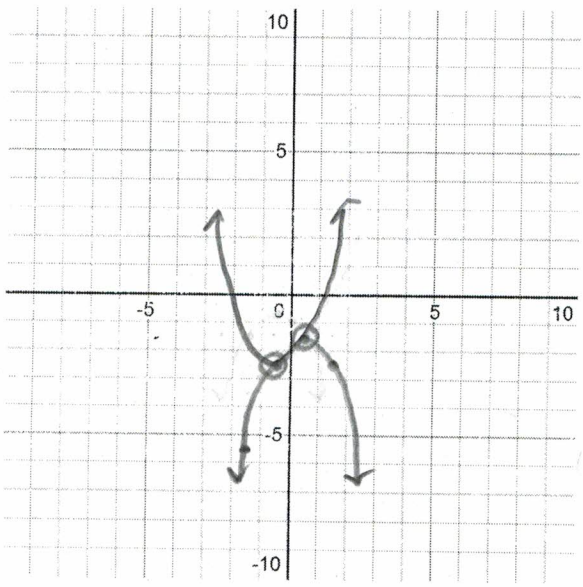
19. $y = -x^2 + x - 1$ ← y-int: $(0,-1)$

$y = x^2 + 2x - 2$ ← y-int: $(0,-2)$

Roots: $x^2 - x + 1$ $\sqrt{1 - 4(1)(1)} \neq \emptyset$

Vertex: $-(x^2 - x + \frac{1}{4} - \frac{1}{4}) - 1$

$-(x - \frac{1}{2})^2 - 3/4 \quad (\frac{1}{2}, -\frac{3}{4})$



$x^2 + 2x - 2$

$\frac{-2 \pm \sqrt{4 - 4(1)(-2)}}{2}$

$\frac{-2 \pm \sqrt{12}}{2}$

$\frac{-2 \pm 2\sqrt{3}}{2} \rightarrow -1 \pm \sqrt{3}$

$= -2.73 \quad 0.732$

vertex: $(x^2 + 2x + 1) - 3$

$(x+1)^2 - 3 \quad (-1,-3)$

Both Vertex

Solution: $\boxed{(-1,-3) \quad (0.5, -0.75)}$

Answer Key – Section 5.1

1. Yes
2. Yes
3. No
4. Yes
5. Yes
6. No
7. $-2\ or\ 8$
8. $-2\ or\ 6$
9. $-7\ or\ 5$
10. $13\ or - 17$
11. $(-2, 0)\ and\ (1, 3)$
12. $(1, 0)$
13. $No\ Solution, Do\ Not\ Intersect$
14. $(-1, -2)$
15. $(1, 1)$
16. $(-1, 2)\ and\ (1, 2)$
17. $(-1, 3)\ and\ (1, 3)$
18. $(1, 0)$
19. $(-1, -3)\ and\ (0.5, -0.75)$

Extra Work Space