Session 5.4

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Team problems

1. **(1 points each)** Find the (x, y) solution to each of the following:

   (a) $\begin{cases} 7x - 8y = -1 \\ y = 5x - 4 \end{cases}$ (c) $\begin{cases} -2x - 3y = -7 \\ y = 6x - 11 \end{cases}$ (e) $\begin{cases} 3x + 12y = -15 \\ x = 8y - 2 \end{cases}$

   (b) $\begin{cases} -11x - 6y = 9 \\ y = -2x + 3 \end{cases}$ (d) $\begin{cases} -4x + 5y = -13 \\ y = -7x + 13 \end{cases}$ (f) $\begin{cases} -2x - 10y = -2 \\ x = 5y - 13 \end{cases}$

2. **(2 points each)** Find the (x, y) solution to each of the following:

   (a) $\begin{cases} 3x + 5y = -35 \\ 6x + 6y = -54 \end{cases}$ (d) $\begin{cases} 4x + 4y = 4 \\ 6x + 2y = -2 \end{cases}$ (g) $\begin{cases} 4x + 3y = -7 \\ 3x + 5y = -19 \end{cases}$

   (b) $\begin{cases} 6x + 4y = 6 \\ 2x + 4y = 2 \end{cases}$ (e) $\begin{cases} 2x + 4y = -14 \\ 5x + 3y = -21 \end{cases}$ (h) $\begin{cases} 5x + 6y = -37 \\ 3x + 5y = -25 \end{cases}$

   (c) $\begin{cases} 3x + 6y = 21 \\ 4x + 2y = 4 \end{cases}$ (f) $\begin{cases} 6x + 2y = -6 \\ 4x + 3y = -9 \end{cases}$ (i) $\begin{cases} 6x + 2y = 10 \\ 4x + 3y = 5 \end{cases}$

3. **(2-6 points each)** For each of the following quadratic polynomials, **either** describe all of the transformations, **or** graph it and label five points. If you describe the transformations (how the graph differs from $y = x^2$), use phrases like, *"nothing"*, or *"up 2, then left 4, then reflected about x-axis"*.

   (a) **(2 pts.)** $y = x^2$
   (b) **(2 pts.)** $y = -x^2$
   (c) **(3 pts.)** $y = x^2 + 4$
   (d) **(3 pts.)** $y = x^2 - 3$
   (e) **(3 pts.)** $y = -x^2 - 2$
   (f) **(3 pts.)** $y = (x - 2)^2$
   (g) **(3 pts.)** $y = (x + 1)^2$
   (h) **(3 pts.)** $y = -(x + 3)^2$
   (i) **(3 pts.)** $y = 2x^2$
   (j) **(3 pts.)** $y = 1/2 * x^2$
   (k) **(5 pts.)** $y = (x + 5)^2 - 9$
   (l) **(5 pts.)** $y = (x - 4)^2 + 6$
   (m) **(5 pts.)** $y = -(x + 6)^2 + 10$
   (n) **(5 pts.)** $y = -(x - 3)^2 - 7$
   (o) **(5 pts.)** $y = -3(x - 7)^2$
   (p) **(6 pts.)** $y = 1/4 * (x-1)^2 + 5$
   (q) **(6 pts.)** $y = -5(x + 4)^2 - 2$
   (r) **(6 pts.)** $y = (3x + 6)^2 + 1$

4. **(3-6 points each)** For each of the following transformations to $y = x^2$, write the quadratic equation in the form $y = c * (x + a)^2 + b$.

   (a) **(3 pts.)** Up 4
   (b) **(3 pts.)** Down 2
   (c) **(3 pts.)** Left 1
   (d) **(3 pts.)** Right 5
   (e) **(3 pts.)** Reflect about x-axis
   (f) **(5 pts.)** Up 2, then right 3
   (g) **(5 pts.)** Down 4, then left 5
   (h) **(5 pts.)** Reflect about x-axis, then right 1
   (i) **(6 pts.)** Reflect about x-axis, then up 4, then left 2
   (j) **(6 pts.)** Up 4, then reflect about x-axis
   (k) **(6 pts.)** Down 7, then reflect about x-axis, then right 3
   (l) **(6 pts.)** Up 4, then reflect about x-axis

5. **(4 points each)** Expand each of the following polynomials:

   (a) $(x+2)^2$
   (b) $(x-7)^2$
   (c) $(x-5)^2$
   (d) $(x+9)^2$
   (e) $(x-12)^2$
   (f) $(x+11)^2$
   (g) $2(x+3)^2$
   (h) $3(x-1)^2$

6. **(5 points each)** Factor each of the following:

   (a) $y = x^2 + 6x + 9$
   (b) $y = x^2 - 14x + 49$
   (c) $y = x^2 - 18x + 81$
   (d) $y = x^2 + 12x + 36$
   (e) $y = x^2 + 24x + 144$
   (f) $y = x^2 - 22x + 121$
   (g) $y = 3x^2 - 30x + 75$
   (h) $y = -4x^2 + 24x - 36$

7. **(10 points each)** Complete the squares of each graph, and describe the transformations happening in words:

   (a) $x^2 - 6x + 14$
   (b) $x^2 + 4x + 11$
   (c) $x^2 + 2x + 10$
   (d) $x^2 - 14 + 40$
   (e) $x^2 - 12x + 12$
   (f) $x^2 + 2x - 4$
   (g) $x^2 - 6x - 6$
   (h) $x^2 + 16x - 10$
   (i) $x^2 + 24x + 100$
   (j) $x^2 + 14x - 9$
   (k) $x^2 - 18x + 53$
   (l) $x^2 + 8x + 27$
   (m) $x^2 + 22x - 21$
   (n) $x^2 - 3x + 1$
   (o) $-x^2 - 14x + 14$
   (p) $-x^2 - 6x + 13$
   (q) $4x^2 - 4x + 20$
   (r) $2x^2 - 2x + 3$
   (s) $-2x^2 + 28x - 7$
   (t) $-2x^2 - 2x + 4$
   (u) $-3x^2 - 24x + 24$