1. Find the slope of the line passing through (3,4), (-5,2).

\[ m = \frac{4 - 2}{3 - (-5)} = \frac{2}{8} = \frac{1}{4} \]

2. Write the equation of the line that satisfies the stated conditions. Express final equations in standard form \((Ax + By = C, \text{ where } B \text{ and } C \text{ are integers, and } A \text{ is a positive integer})\).
   a. Having a slope of 6 and a y-intercept of (0,5).

\[ 6x - y = 5 \]

b. Containing the point (2,5) and parallel to the line \(x - 3y = 2\)

\[ y = \frac{1}{3}x + \frac{5}{3} \]

\[ \frac{1}{3}(2) + b = 5 \]
\[ b = \frac{15}{2} - \frac{2}{3} = \frac{13}{3} \]

2c. Having a y-intercept of (0,3) and parallel to the x-axis.

\[ y = 3 \]

3. A certain highway has a 6% grade. How many feet does it rise in a horizontal distance of 2 mile?

\[ \frac{3}{50} \times 5280 \times 2 \]
\[ 50x = 3 \times 10560 \]
\[ 50x = 31680 \]
\[ x = 633.6 \]
4. Graph each equation. (Label at least two points.)
   a. \[ y = 3x + 2 \]
   \[
   \begin{array}{c|c}
   x & y \\
   \hline
   0 & 2 \\
   -1 & -1 \\
   \end{array}
   \]
   b. \[ y = -\frac{1}{4}x + 1 \]
   \[
   \begin{array}{c|c}
   x & y \\
   \hline
   0 & 1 \\
   4 & 0 \\
   -4 & 2 \\
   \end{array}
   \]

5. Graph each inequality.
   a. \[ y > \frac{3}{2}x - 2 \]
   b. \[ -2 \leq x \leq 1 \text{ and } -1 \leq y \leq 2 \]

6. Determine the type(s) of symmetry (symmetry with respect to the x axis, y axis, and/or origin) for the following equation.
   \[ y = x^2 - 2 \]
   - y-axis: Yes
   - x-axis: Yes
7. Write the standard form \([(x-h)^2 + (y-k)^2 = r^2]\) of equation for a circle with center \((-2, 3)\) and radius 2.

\[(x+2)^2 + (y-3)^2 = 4\]

\[C\]

8. Find the center and radius for the circle \((x-6)^2 + (y+2)^2 = 25\).

Center \((6, -2)\)

Radius = \(\sqrt{25} = 5\)

\[C\]

9. Write the vertex and axis of symmetry line for \(y = -2(x-1)^2\).

\[V = (1, 0)\]

Axis of symmetry \(x = 1\)

\[C\]

10. Use completing the square to write the equation \(y = x^2 + 4x + 2\) in the form \(y = a(x-h)^2 + k\) and graph.

\[y = (x+2)^2 + 2 - 4\]

\[y = (x+2)^2 + 2\]

Vertex \((-2, -2)\)

\[C\]

11. Find the distance between the points \((6,3)\) and \((2,-1)\). (Simplify your answer.)

\[d^2 = (6-2)^2 + (3-(-1))^2 = 4^2 + 4^2 = 16 + 16 = 32\]

\[d = \sqrt{32}\]

\[d = 4\sqrt{2}\]
12. Use completing the square to write $x^2 + 10x + y^2 + 2y - 38 = 0$ in standard form $(x-h)^2 + (y-k)^2 = r^2$ and state the center and the length of a radius.

$$\begin{align*}
\text{(8 pts)} & \quad x^2 + 10x + 25 + y^2 + 2y + 1 = 38 + 25 + 1 \\
& \quad (x + 5)^2 + (y + 1)^2 = 64 \\
& \quad \text{Center: } (-5, -1) \\
& \quad \text{Radius: } \sqrt{64} = 8
\end{align*}$$

13. Graph.

(a) (8 pts) $\frac{x^2}{16} + \frac{y^2}{4} = 1$

- Center: $(0, 0)$
- x-intercepts: $(\pm 4, 0)$
- y-intercepts: $(0, \pm 2)$

(b) $\frac{(x-2)^2}{9} - \frac{(y-1)^2}{4} = 1$

- Asymptotes:
  - $y - 1 = \pm \frac{2}{3} (x - 2)$
  - $y - 1 = \pm \frac{2}{3} x + \frac{2}{3}$

- Center: $(2, 1)$
- Points:
  - $(\pm 3, 0)$
  - $(0, 2)$
- No y-intercepts.
14. Find the equations of the asymptotes for the following hyperbola: \( \frac{x^2}{9} - \frac{y^2}{16} = 1 \)

\[ y = \pm \frac{4}{3} x \]

Center: (0, 0)

a = \{ \pm 3, 0 \}

b = \{ 0, \pm 4 \}

15. Use completing the square to write \( 4x^2 - 16x + y^2 + 6y + 9 = 0 \) in standard form and graph.

\[
\frac{1}{16} \left( 4(x-2)^2 + (y+3)^2 = 16 \right) \left( \frac{1}{16} \right)
\]

\[
\frac{(x-2)^2}{4} + \frac{(y+3)^2}{16} = 1
\]

Center: (2, -3)

x-inter. \( \Rightarrow (3, 0) \)

y-inter. \( \Rightarrow (0, 4) \)