Review – Sketching Linear Functions

y-intercept Form: $y = mx + b$

Sketching Method:

- Identify the slope m and the y-intercept b.
- Plot the y-intercept at $(0, b)$.
- Use the slope $m = \frac{rise}{run}$ to plot a second point.
- Draw the line through the points.

$$y = \frac{1}{2}x - 3 \qquad\qquad y = \frac{3}{5}x - 4 \qquad\qquad y - \frac{1}{4}x = \frac{3}{2}$$

$$y - 1 = -\frac{3}{4}x \qquad\qquad y - 2 = -\frac{7}{3}x \qquad\qquad 6y + 3 = -5x$$

Slope-Point Form: $y - y_1 = m(x - x_1)$

Sketching Method:

- Identify the point (x_1, y_1) and the slope m.
- Plot the point (x_1, y_1) on the graph.
- Use the slope $m = \frac{rise}{run}$ to plot a second point.
- Draw the line through the points.

$$y - 5 = -\frac{3}{2}(x + 1) \qquad y - 4 = \frac{2}{3}(x - 6) \qquad y - \frac{1}{2} = \frac{3}{4}(x + 2)$$

$$y = -\frac{5}{4}(x + 2) + 2 \qquad y = -\frac{5}{2}(x - 1) - 3 \qquad 3y + \frac{15}{2} = -7(x + 4)$$

General Form: $Ax + By = C$

Sketching Method:

- Find the y-intercept: set x = 0 and calculate y.
- Find the x-intercept: set y = 0 and solve for x.
- Plot both intercepts.

Draw the line connecting them

$$4x - 3y = 6 \qquad\qquad 6x + y = 9 \qquad\qquad 7x + 3y = -21$$

$$5x + 4y = -20 \qquad\qquad 4x - 5y = 10 \qquad\qquad 9x - 4y = 12$$

Review – Sketching Quadratic Functions

Standard (Vertex) Form: $y = a(x - p)^2 + q$

Sketching Method 1
- Read the vertex (h, k).
- Draw the axis of symmetry, vertically through the vertex.
- Find the **y-intercept** with $f(0)$.

$y = \dfrac{1}{2}(x - 4)^2 - 2$ $\qquad\qquad$ $y = \dfrac{3}{2}(x - 2)^2 - 1$ $\qquad\qquad$ $y = 4(x - \dfrac{1}{2})^2 - 3$

$y = 2(x + 1)^2 - 3$ $\qquad\qquad$ $y = -(x + 3)^2 + 4$ $\qquad\qquad$ $y = -2(x + \dfrac{3}{2})^2 + \dfrac{1}{2}$

General Form: $y = ax^2 + bx + c$

Sketching Method 2
- Identify a, b, and c.
- Identify the **x-intercepts:** $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ OR
- Find the **axis of symmetry** by averaging the x-intercepts.
- Find the **vertex** with f(axis of symmetry).

$y = -x^2 + 4x + 1$ $\qquad\qquad$ $y = 2x^2 - 8x + 5$ $\qquad\qquad$ $y = 3x^2 + 6x + 1$

$y = 3x^2 - 12x + 9$ $\qquad\qquad$ $y = -x^2 - 2x + 6$ $\qquad\qquad$ $y = -4x^2 + 12x - 7$

Factored Form: $y = a(x - r_1)(x - r_2)$

Sketching Method
- Identify the **x-intercepts** by solving for x in each of the binomials.
- Find the **axis of symmetry** by averaging the x-intercepts.
- Find the **vertex** with f(axis of symmetry).

$y = -(x - 2)(x + 1)$ $\qquad\qquad$ $y = -3(x + 2)(x + 4)$ $\qquad\qquad$ $y = -2(x + 1)(x - 4)$

$y = \dfrac{1}{2}(x - 4)(x - 6)$ $\qquad\qquad$ $y = (x - 1)(x - 5)$ $\qquad\qquad$ $y = \dfrac{3}{2}(x - 2)(x + 6)$