Directions: Please answer the following questions and make sure your answer are legible. You must show your work to receive credit for your answers. You may not use a calculator (or any other technology) on this quiz. Good Luck.

1. (7 points)
   Use the graph of \( y = f(x) \) to answer the following
   \( (1.6 \# 58, 59, 63, 69-73) \)
   (a) (Write your answer in interval notation.)
      Find the domain of \( f \). \([-4, 4]\)
      Find the range of \( f \). \([-5, 5]\)
   (b) Find the zeros of \( f \). \(-4, 0, 4\)
   (c) List the intervals where \( f \) is decreasing \((-4, -2) \cup (2, 4)\)
   (d) List the local maximums of \( f \), if any exist None
   (e) List the local minimums of \( f \), if any exist \((-2, -5)\)
   (f) Find the maximum of \( f \) (if it exists) None
   (g) Find the minimum of \( f \) (if it exists) \( f(2) = -5 \)

2. (2 points) Let \( f(x) = \sqrt{x} \). Find a formula for a function \( g \) whose graph is obtained from \( f \) from the given sequence of transformations:
   (1) shift left 3 units; (2) shift down 4 units; (3) vertical stretch by a factor of 2 \( (1.7 \# 61) \)
   \( \text{(1)} \quad y = \frac{1}{3} \left( x + 3 \right) \)
   \( \text{(2)} \quad y = 2 \left( f(x-3) \right) - 4 \)
   \( \text{(3)} \quad y = \sqrt{x} - 3 \)

3. (3 points) Find the slope-intercept form of the line which passes through the points \( (\frac{1}{2}, \frac{3}{4}) \) and \( (\frac{5}{2}, \frac{-7}{4}) \). \( (2.1 \# 18) \)
   \[
   m = \frac{\frac{10}{4} - \frac{-2}{4}}{\frac{5}{2} - \frac{5}{2}} = \frac{12}{4} = \frac{3}{1} = \frac{\frac{3}{4}}{\frac{4}{4}} = \frac{-20}{4} = -20
   \]
   \[
   \left( y - \frac{3}{4} \right) = -20 \left( x - \frac{1}{4} \right)
   \]
   \[
   y - \frac{3}{4} = -20x + 10
   \]
   \[
   y = -20x + 10 + \frac{2}{4}
   \]
   \[
   y = -20x + \frac{43}{4}
   \]

Turn over for More Questions.
4. (6 points) Use the given graph of \( y = f(x) \) to graph the transformed function:

\[ p(x) = 4 + f(1 - 2x) \]  \hspace{1cm} (1.7 \# 48)

\[ p(x) = f(-2x + 1) + 4 \]

- Reflect over the \( y \)-axis.
- Shift down 4.

(-3,0) \rightarrow (-1,0) \rightarrow (\frac{1}{2},1) \rightarrow (3,4)

(0,3) \rightarrow (-1,3) \rightarrow (\frac{1}{2},3) \rightarrow (\frac{1}{2},7)

(3,0) \rightarrow (-1,0) \rightarrow (-1,4)

The graph for Ex. 38 - 49

5. (8 points) For \( f(x) = |x + 2| + x \)  \hspace{1cm} (2.2 \# 31)

(a) Find the \( x \)-intercepts (if any).

(b) Graph the function.

\[ |x + a| = \begin{cases} 
-(x + a) & x < -a \\
(x + a) & x \geq -a
\end{cases} \]

\[ -x = |x + a| 
\]

\[ x + 2 = x \]  \hspace{1cm} \text{if} \hspace{0.5cm} -x \geq 0

\[ x + 2 = -x \]  \hspace{1cm} \text{or} \hspace{1cm} x + 2 = -x

\[ 0 = 2 \]

\[ 2x = -4 \]

\[ x = -2 \]

\[ x \neq -2 \]