Problem 1: Determine whether the following equation defines $y$ as a function of $x$: $y + x^2 = -10$

Problem 2: Evaluate the difference quotient $\frac{f(x + h) - f(x)}{h}$ for the function $f(x) = x^2 + 3x - 4$

Problem 3: Evaluate the piecewise function at the given values:

\[ f(x) = \begin{cases} 
\sqrt{x + 6} & \text{if } x \geq -6 \\
\sqrt{6 - x} & \text{if } x < -6 
\end{cases} \]

a. $f(-6)$

b. $f(-10)$
Problem 4: Find the domain of the following functions:

a. \( h(x) = \frac{-3x}{x^2 + 6x + 8} \)

b. \( f(x) = \frac{5}{\sqrt{x + 4}} \)

Problem 5: Graph the following function by plotting points using the given values for \( x \). Be sure to use an appropriate scale on the graph.

\[ f(x) = x^2 + 2 \quad x = -2, -1, 0, 1, 2 \]

\[ f(-2) = \quad f(-1) = \quad f(0) = \quad f(1) = \quad f(2) = \]

\[
\begin{array}{c|c|c|c|c|c}
\hline
x & -2 & -1 & 0 & 1 & 2 \\
\hline
y & \_ & \_ & \_ & \_ & \_ \\
\hline
\end{array}
\]

\[
\begin{array}{c|c|c|c|c|c}
\hline
x & -2 & -1 & 0 & 1 & 2 \\
\hline
y & \_ & \_ & \_ & \_ & \_ \\
\hline
\end{array}
\]
**Problem 6:** Use the following graph to find the domain, range, $x$-intercepts (if any), and $y$-intercepts (if any). Write the domain and range in interval notation.

![Graph](image)

Domain: _______________  Range: _______________

$x$ -intercepts: _______________  $y$ -intercept: _______________

**Problem 7:** Use the vertical line test to identify graphs in which $y$ is a function of $x$. Write “function” or “not a function” below each graph.

![Graphs](image)

**Problem 8:** Use the graph to determine intervals on which the function is increasing, decreasing, or constant (if any). Write the answers in interval notation.

![Graph](image)

Increasing: _____________________________

Decreasing: _____________________________

Constant: _____________________________
Problem 9: Use the graph to write the coordinates of the relative and absolute maxima and minima (if any).

Absolute Maxima:__________________________
Relative Maxima:__________________________
Absolute Minima:__________________________
Relative Minima:__________________________

Problem 10: Determine whether the following function is even, odd, or neither: $f(x) = x^2 \sqrt{x^2 + 5}$

Problem 11: Use possible symmetry to determine whether each graph is the graph of an even function, an odd function, or a function that is neither even nor odd. Write either “even”, “odd”, or “neither” below each graph.
Problem 12: Find the average rate of change of \( f(x) = \sqrt{x - 8} \) from \( x_1 = 9 \) to \( x_2 = 24 \).

Problem 13: Find the value of the given function combination or composition:

a. If \( f(x) = 4x^2 + x - 6 \) and \( g(x) = x^2 - 2 \), find \((f - g)(3)\):

b. For \( f(x) = -x \) and \( g(x) = 7x + 1 \), find \((f \circ g)(4)\):

Problem 14: Find \((\frac{f}{g})(x)\) for \( f(x) = \sqrt{x + 1} \) and \( g(x) = x - 1 \) and determine its domain:
Problem 15: For \( f(x) = \frac{x}{x+1} \), \( g(x) = \frac{4}{x} \), find \( (f \circ g) \) and its domain. Simplify all answers.

Problem 16: Find an equation for the inverse function, \( f^{-1}(x) \), of \( f(x) = \frac{x - 2}{2x + 1} \).

Problem 17: Determine whether each pair of functions \( f \) and \( g \) are inverses of each other.

a. \( f(x) = 2x - 1 \) and \( g(x) = \frac{x + 1}{2} \)

b. \( f(x) = \sqrt[3]{x - 4} \) and \( g(x) = x^3 + 4 \)
**Problem 18:** Determine which of the following graphs represent functions that have an inverse (i.e., are one-one functions). Write “has an inverse” or “no inverse” underneath each graph.

![Graphs](Image)

**Problem 19:** Use the graph of the given function to draw the graph of its inverse function.

![Graph](Image)