

Homework 4

Problem 1 is similar to the example on page 79. Problem 2 is similar to Problems 1-10 on page 84. Problem 5 is similar to Problems 42-57 on page 108.

1. Let $f(x) = x^2 + x$. Simplify the expression

$$\frac{f(a+h) - f(a)}{h}$$

2. Let $f(x) = x + 1$ and $g(x) = \frac{1}{\sqrt{x+2}}$. Find the following values if they exist.

- (a) $(f + g)(1)$
- (b) $\left(\frac{f}{g}\right)(-3)$
- (c) $\left(\frac{g}{f}\right)(-1)$
- (d) $(fg)(2)$

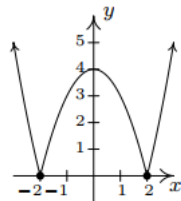
3. State the domain of the following functions. Identify the intercepts with the x -axis and y -axis. Determine if the function is odd, or even, or neither of those.

- (a) $f(x) = x - 1$
- (b) $f(x) = \frac{1}{x^2 - 1}$

4. Let $f(x)$ be a function defined piecewise as follows:

$$f(x) = \begin{cases} x^2 & \text{if } x \leq -1, \\ 2 + x & \text{if } -1 < x \leq 1, \\ 3 & \text{if } x > 1. \end{cases}$$

- (a) Graph the function.
 - (b) Find $f(-1)$, $f(0)$, $f(1)$, $f(2)$ if they exist.
 - (c) Find x such that $f(x) = 0$.
5. Use the graph of $y = f(x)$ given below to answer the question.



- (a) Find the domain of f .
- (b) Find the range of f .
- (c) Find the intervals of x such that $f(x) \geq 0$.
- (d) List the intervals where f is decreasing.
- (e) List the local minima and maxima if any exist.