

Homework 5: Due Friday March 3rd in recitation.

Late homework will not be accepted. **Write on only one side of each page. Staple all work.**

1. Find the difference quotient  $\frac{f(a+h)-f(a)}{h}$  where  $f(x) = \frac{5x}{x+1}$ .

2. Find the domain of  $f$ . Write your final answer in interval notation.

(a)  $f(x) = \frac{1}{(x^2+2x)\sqrt{x^2-4}}$

(b)  $f(x) = \frac{x^2+3x-10}{x+11}$ .

3. I love Amazon, but I am not a Prime member. Of course, like all people who love Amazon, we are always looking for free shipping. Amazon will grant free shipping provided that my order totals at least \$35, but I am charged a shipping fee of \$7.50 otherwise. Suppose that I am placing an order for books, and the cost is  $x$ . Write a function,  $C(x)$ , for the total cost of the books.

4. Consider the piecewise function

$$f(x) = \begin{cases} x & x < -3 \\ x^2 & -3 < x \leq 4 \\ 3x + 2 & x > 4 \end{cases}$$

(a) Find the domain of  $f(x)$ . Write your answer in interval notation.

(b) Graph  $f(x)$ .

(c) Find the range of  $f(x)$ . Write your answer in interval notation.

5. Determine whether the equation defines  $y$  as a function of  $x$ .

1.  $2x^2 - 4y^2 = 3$

2.  $\sqrt{y} - x = 5$

3.  $2|x| + y = 0$

6. Some functions are given below. Determine (a) the net change and (b) the average rate of change between the given intervals:

1.  $f(x) = x^3 - 4x^2$ ;  $x = 0, x = 10$

2.  $g(x) = \frac{1}{x}$ ;  $x = 1, x = a$

3.  $h(x) = \frac{2}{x+1}$ ;  $x = 0, x = h$