

# 1 Week 12 HOGU: 5.5-5.8, Exam 3 Review

**Problem 1.** What is the domain of the piecewise function given below? Write your answer in interval notation.

$$f(x) = \begin{cases} \frac{1}{\sqrt{4-2x}} & \text{if } x \leq 3 \\ x^2 - 4 & \text{if } 4 < x < 6 \\ \frac{8}{x-8} & \text{if } x > 7 \end{cases}$$

**Problem 2.** Write the equivalent piecewise-defined function for

$$k(x) = |2x - 1|.$$

**Problem 3.** Your electric bill came in! On your bill you noticed that you were charged \$7 as a base fee, plus \$6 per kilowatt-hour of electricity used up to the first 100 kilowatt-hours. (These numbers were taken from my own electric bill!) After using 100 kilowatt-hours, you notice that the amount you are charged goes up to \$9 per kilowatt-hour. Construct the piecewise function describing the cost  $C(x)$ , in dollars, that you pay when using  $x$  kilowatt-hours of electricity.

**Problem 4.** Find the domain of the following functions:

(a)  $4e^{x-1}$

(b)  $\ln(1-x)$

(c)  $\frac{\sqrt{x^3-8}}{\ln(x)}$

**Problem 5.** (a) Completely simplify this expression to be in base 6:

$$\frac{36^{x^2}}{6^{-4x}}$$

(b) Fully expand the expression using the properties of logarithms:

$$\ln \left( \sqrt[3]{\frac{x^3}{e^2 z^4}} \right).$$

**Problem 6.** Solve the following equations for  $x$ :

(a)  $4^{x+1} = 64$

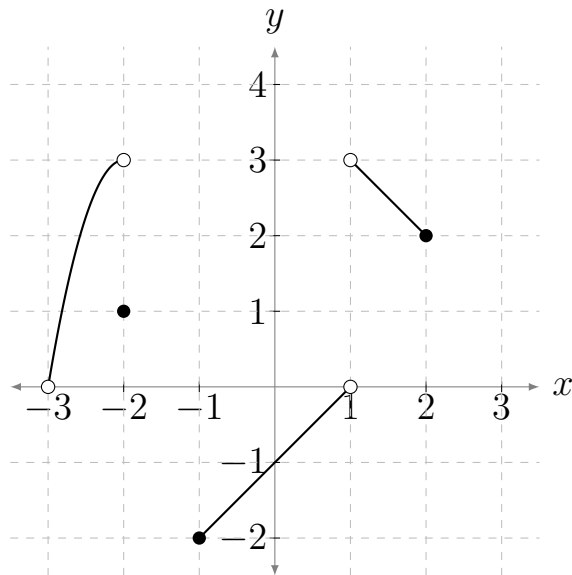
(b)  $\ln(x) + \ln(x - 2) = \ln(x + 10)$

(c)  $2 \cdot 3^{-x} = 16$

**Problem 7.** The amount in a savings account, compounded annual, is computed by  $A = P(1+r)^t$ , where  $A$  is the accumulated amount,  $P$  is the amount of the original deposit,  $r$  is the annual interest rate (in decimal form) and  $t$  is time since deposit, in years.

If you deposit \$12,000 in this savings account and the interest rate on the account is 7%, how long would it take the savings account to grow to \$25,000?

**Problem 8.** Consider the function  $f(x)$  below:



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

(b) State the range of  $f(x)$ . Write your answer in interval notation.



**Problem 9.** Multiply the following rational expressions and completely simplify:

$$\left(\frac{m^2 - 9}{3m - 15}\right) \cdot \left(\frac{m^2 - m - 20}{m^2 + 3m}\right)$$

**Problem 10.** Subtract the following rational expressions and completely simplify:

$$\frac{9}{4x - 10} - \frac{9}{10x - 25}$$

**Problem 11.** Compute and completely simplify the difference quotient for the function  $g(x) = -\frac{3}{x+1}$ .

(a)  $g(x+h) =$

(b)  $g(x+h) - g(x) =$

(c)  $\frac{g(x+h) - g(x)}{h} =$

**Problem 12.** Compute and completely simplify the difference quotient for the function  $k(x) = \sqrt{2x - 5}$ .

(a)  $k(x + h) =$

(b)  $k(x + h) - k(x) =$

(c)  $\frac{k(x + h) - k(x)}{h} =$