APPC Lesson 2.5 Homework

Name _____

1. The rate at which people enter an exhibition hall is given by
$E(t) = \dfrac{8600}{t^2 - 20t + 180}$, where t is measured in hours after midnight and
$E(t)$ is measured in people per hour. The function is valid for $7 < t < 12$
which represents the five hours that the exhibition hall is open.

a. Explain why E is a rational function.

b. Find $E(10)$ and interpret this value in the context of this problem.

2. Write the equation of the horizontal asymptote for each rational function or explain why there is no horizontal asymptote.

a. $f(x) = \dfrac{3x^2 + 5x - 1}{8x^2 - 7}$

b. $g(x) = \dfrac{2x - 1}{x^2 + 5}$

c. $h(x) = \dfrac{4x^3 + 5x^4 - 2}{2x^3 - 12x + 1}$

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3. The directions on a can of orange juice concentrate say to add three 12 oz cans of water to one 12 oz can of the orange juice concentrate. Irmgard thinks that regular orange juice is too sweet, so she likes to dilute it with water. Suppose that x ounces of water are added to a pitcher of the prepared juice.

a. If the orange juice is made according to package instructions, what percent of the pitcher is concentrate? What percent is water?

b. Does $C(x) = \dfrac{36 + x}{48 + x}$ represent the concentration of water in the pitcher, the concentration of orange juice concentrate, or neither? Explain.

c. How much water should Irmgard add so that the concentration in the pitcher is 15% orange juice concentrate?

d. Interpret the meaning of $\lim\limits_{x \to \infty} C(x)$ in the context of this problem.

4. Write an equation for a rational function, g, such that $\lim\limits_{x \to \infty} g(x) = 4.$

5. The cost of renting an AirBnB is $74 per guest plus a cleaning fee of $130.

    a. Write an equation for a function C where $C(x)$ gives the cost per guest if x guests stay at the AirBnB.

    b. How many guests are neede so that each guest pays $100?

    c. What is the least amount that each guest would ever have to pay? Is this realistic? Explain.

6. The function given be $f(x) = \dfrac{-3x^5 + 10x^3 + 2}{x^3 - 7x + 10}$ has the same end behavior as

I. $y = -3x^5$

II. $y = 3x^2$

III. $y = -x^2$

A) II only

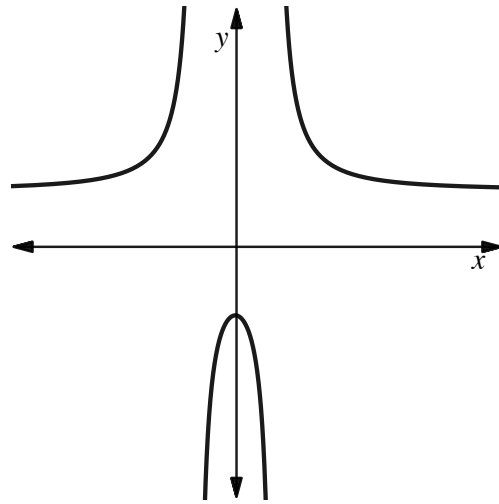B) III only

C) I and III only

D) I, II, and III

7. Which equation could represent the graph shown?

A) $y = \dfrac{4x + 5}{2x^2 - 1}$

B) $y = \dfrac{2x^2 + 5}{x^2 - 2}$

C) $y = \dfrac{2x^3 + 5}{x^2 - 2}$

D) $y = \dfrac{3x^2 + 8}{x^3 - 4}$

8.

Let $f(x) = \dfrac{6x^4 + 2x^3 + 8}{2x^2}$

a. What is the doman of f?

b. Rewrite the equation for $f(x)$ by dividing each term in the numerator by the denominator.

c. Describe what happens to each term in your rewritten expression as x increases without bound.

d. Find $\lim\limits_{x \to \infty} f(x)$ or explain why it does not exist.

e. Imagine if the equation for $f(x)$ was $f(x) = \dfrac{6x^4 + 2x^2 + 8}{2x^2}$. How would your answers to parts b-d change?

f. Explain how your work in this question supports the "rules" for finding end behavior of rational functions.