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Student: _____
Date: _____

Instructor: Annette King
Course: Spring 1 2020 CTC College Algebra

Assignment: Chapter 3 Polynomial and Rational
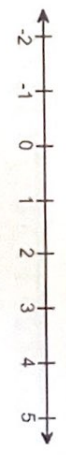Functions Quiz

1. Solve the rational inequality and graph the solution set on a real number line. Express the solution set in interval notation.

$$\frac{13x - 3}{5x - 2} \leq 3$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The solution set is _____.

(Type your answer in interval notation. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression.)

○ **B.** The solution set is the empty set.

Choose the correct graph below.

○ **A.**

-2 -1 0 1 2 3 4 5

○ **B.**

-2 -1 0 1 2 3 4 5

○ **C.**

-2 -1 0 1 2 3 4 5

○ **D.**

-2 -1 0 1 2 3 4 5

○ **E.**

-2 -1 0 1 2 3 4 5

○ **F.**

-2 -1 0 1 2 3 4 5

2. Answer the following questions about the equation below.

$$12x^3 + 77x^2 - 48x + 7 = 0$$

(a) List all rational roots that are possible according to the Rational Zero Theorem.

○ **A.** $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12$

○ **B.** $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm \dfrac{1}{7}, \pm \dfrac{2}{7}, \pm \dfrac{3}{7}, \pm \dfrac{4}{7}, \pm \dfrac{6}{7}, \pm \dfrac{12}{7}$

○ **C.** $\pm 1, \pm 7, \pm \dfrac{1}{2}, \pm \dfrac{7}{2}, \pm \dfrac{1}{3}, \pm \dfrac{7}{3}, \pm \dfrac{1}{4}, \pm \dfrac{7}{4}, \pm \dfrac{1}{6}, \pm \dfrac{7}{6}, \pm \dfrac{1}{12}, \pm \dfrac{7}{12}$

○ **D.** $\pm 1, \pm 7$

(b) Use synthetic division to test several possible rational roots in order to identify one actual root.

One rational root of the given equation is _____ .
(Simplify your answer.)

(c) Use the root from part (b) to solve the equation.

The solution set is { _____ }.
(Simplify your answer. Type an exact answer, using radicals as needed. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)
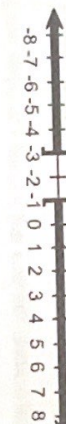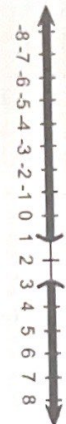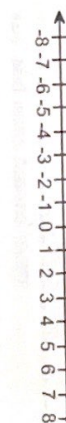
3. Solve the polynomial inequality and graph the solution set on a real number line. Express the solution set in interval notation.

$$x^2 + 4x + 3 > 0$$

What is the solution set? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

○ **A.** The solution set is _____.

(Type your answer in interval notation. Use integers or fractions for any numbers in the expression.)

○ **B.** The solution set is the empty set.

Which number line below shows the graph of the solution set?

○ **A.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **B.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **C.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **D.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **E.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **F.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **G.**

-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

○ **H.**
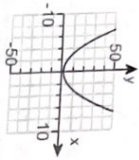
-8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6 7 8

4. **a.** Find the slant asymptote of the graph of the rational function.

b. Follow the seven-step strategy and use the slant asymptote to graph the rational function.
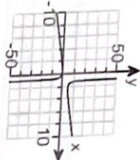
$$f(x) = \frac{x^2 + 1}{x - 1}$$

a. The slant asymptote of the graph of the function is y = _____ .
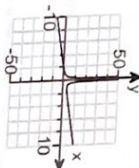
b. Which of the following is the graph of y = f(x)?

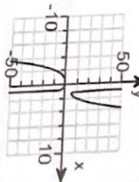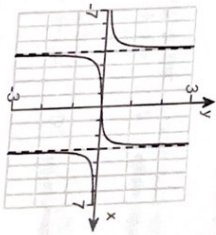○ **A.**

○ **B.**

○ **C.**

○ **D.**

5. Use the graph of the rational function to complete the following statement.

As x → 3⁻ , f(x) → _____ .

As x → 3⁻ , f(x) → _____ .

6. For the polynomial function $f(x) = x^4 + 4x^3 + 4x^2$, answer the parts **a** through **e.**

a. Use the Leading Coefficient Test to determine the graph's end behavior.

- ○ **A.** The graph of f(x) rises to the left and rises to the right.
- ○ **B.** The graph of f(x) falls to the left and falls to the right.
- ○ **C.** The graph of f(x) falls to the left and rises to the right.
- ○ **D.** The graph of f(x) rises to the left and falls to the right.

b. Find the x-intercept(s). State whether the graph crosses the x-axis, or touches the x-axis and turns around, at each intercept.

The x-intercept(s) is/are _____.
(Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)

At which x-intercept(s) does the graph cross the x-axis? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** The x-intercept(s) at which the graph crosses the x-axis is/are _____.
  (Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)

- ○ **B.** There are no x-intercepts at which the graph crosses the x-axis.

At which x-intercept(s) does the graph touch the x-axis and turn around? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** The x-intercept(s) at which the graph touches the x-axis and turns around is/are _____.
  (Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)

- ○ **B.** There are no x-intercepts at which the graph touches the x-axis and turns around.

c. Find the y-intercept.

The y-intercept is _____.
(Simplify your answer. Type an integer or a decimal.)

d. Determine whether the graph has y-axis symmetry, origin symmetry, or neither. Choose the correct answer below.

- ○ **A.** The graph of f is symmetric about the y-axis.
- ○ **B.** The graph of f is symmetric about the origin.
- ○ **C.** The graph of f is neither symmetric about the y-axis nor symmetric about the origin.

8. Use the seven step method described in the book to graph the following rational function.

$$f(x) = -\frac{3}{x^2 - 4}$$

1. Determine the symmetry of the function. Choose the correct answer below.

○ The graph of f has neither y-axis symmetry nor origin symmetry.

○ The graph of f is symmetric with respect to the origin.

○ The graph of f is symmetric with respect to the y-axis.

2. Find the y-intercept. Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The y-intercept is _____ . (Type an integer or a simplified fraction.)

○ **B.** There is no y-intercept.

3. Find the x-intercept(s). Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** The x-intercept(s) is _____ . (Use a comma to separate answers as needed.)

○ **B.** There is no x-intercept.

4. What is the equation of the vertical asymptote(s) of f(x)? Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** x = _____ (Use a comma to separate answers as needed. Type an integer or a fraction.)

○ **B.** There is no vertical asymptote.

5. What is the equation of the horizontal asymptote(s) of f(x)? Select the correct choice below and fill in any answer boxes within your choice.

○ **A.** y = _____ (Use a comma to separate answers as needed. Type an integer or a fraction.)

○ **B.** There is no horizontal asymptote.

**6.** Plot points between and beyond the x-intercept and the vertical asymptotes. Type the y-coordinate for each of the following points.

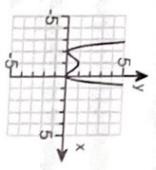| x	−3	−1	$\frac{1}{2}$	1	3
$f(x) = -\dfrac{3}{x^2 - 4}$					

(Type an integer or a simplified fraction.)

e. If necessary, find a few additional points and graph the function. Use the maximum number of turning points to check whether it is drawn correctly. Choose the correct graph below.
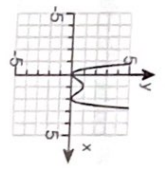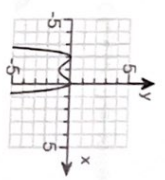
A.
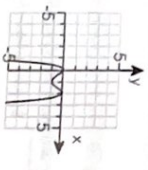
B.

C.

D.

7. Divide using synthetic division.

$$\frac{x^5 + 4x^3 - 5}{x - 1}$$

$$\frac{x^5 + 4x^3 - 5}{x - 1} = \underline{\hspace{2cm}} + \frac{\underline{\hspace{1cm}}}{x - 1}$$

(Simplify your answers. Do not factor.)

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