Lesson 19 Practice Problems

1. The function $f(x) = \frac{5x+2}{x-3}$ can be rewritten in the form $f(x) = 5 + \frac{17}{x-3}$. What is the end behavior of $y = f(x)$?

2. Rewrite the rational function $g(x) = \frac{x^2+7x-12}{x+2}$ in the form $g(x) = p(x) + \frac{r}{x+2}$, where $p(x)$ is a polynomial and r is an integer.

3. Match each polynomial with its end behavior as x gets larger and larger in the positive and negative directions. (Note: Some of the answer choices are not used and some answer choices are used more than once.)

A. $p(x) = \frac{3}{x-1}$

B. $q(x) = \frac{2x}{x-1}$

C. $r(x) = \frac{2x+3}{x-1}$

D. $s(x) = \frac{2x^2+x+3}{x-1}$

E. $t(x) = \frac{x^3}{x-1}$

1. The graph approaches $y = 2$.
2. The graph approaches $y = 3$.
3. The graph approaches $y = 2x + 3$.
4. The graph approaches $y = x^2 + x + 1$.
5. The graph approaches $y = 0$.

4. Let the function P be defined by $P(x) = x^3 + 2x^2 - 13x + 10$. Mai divides $P(x)$ by $x + 5$ and gets:

$$
\begin{array}{r}
x^2 - 3x + 2 \\
x + 5 \overline{)\, x^3 + 2x^2 - 13x + 10} \\
\underline{-x^3 - 5x^2} \\
-3x^2 - 13x \\
\underline{3x^2 + 15x} \\
2x + 10 \\
\underline{-2x - 10} \\
0
\end{array}
$$

How could we tell by looking at the remainder that $(x + 5)$ is a factor?

(From Unit 2, Lesson 13.)

5. For the polynomial function $f(x) = x^4 + 3x^3 - x^2 - 3x$ we have $f(\text{-}3) = 0$, $f(\text{-}2) = \text{-}6$, $f(\text{-}1) = 0$, $f(0) = 0$, $f(1) = 0$, $f(2) = 30$, $f(3) = 144$. Rewrite $f(x)$ as a product of linear factors.

(From Unit 2, Lesson 15.)

6. There are many cones with a volume of 60π cubic inches. The height $h(r)$ in inches of one of these cones is a function of its radius r in inches where $h(r) = \frac{180}{r^2}$.

   a. What is the height of one of these cones if its radius is 2 inches?

   b. What is the height of one of these cones if its radius is 3 inches?

   c. What is the height of one of these cones if its radius is 6 inches?

(From Unit 2, Lesson 16.)

7. A cylindrical can needs to have a volume of 10 cubic inches. There needs to be a label around the side of the can. The function $S(r) = \frac{20}{r}$ gives the area of the label in square inches where r is the radius of the can in inches.

   a. As r gets closer and closer to 0, what does the behavior of the function tell you about the situation?

   b. As r gets larger and larger, what does the end behavior of the function tell you about the situation?

(From Unit 2, Lesson 17.)

8. Match each rational function with a description of its end behavior as x gets larger and larger.

A. $9x$

B. $\frac{9}{x}$

C. $\frac{99x}{x}$

D. $\frac{99+x}{x}$

E. $\frac{99x+9}{x}$

F. $\frac{99+9x}{x}$

1. The value of the expression gets closer and closer to 0.
2. The value of the expression gets closer and closer to 1.
3. The value of the expression gets closer and closer to 9.
4. The value of the expression is 99.
5. The value of the expression gets larger and larger in the positive direction.
6. The value of the expression gets larger and larger in the negative direction.

(From Unit 2, Lesson 18.)