**HAPC**
**Unit 1**
**1.7 Rational Functions and End Behavior**

Name: _____

Hour: _____ Date: _____

**Directions:** For each of the following rational functions write the **equation** of the asymptote. Then write the **left** and **right** limit statements to describe the end behavior.

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

[Horizontal]

Equation: $y=\frac{3}{2}$

Left: $\lim\limits_{x\to-\infty} f(x)=\frac{3}{2}$

Right: $\lim\limits_{x\to\infty} f(x)=\frac{3}{2}$

2. $h(x)=\dfrac{5x^3-2x^2-1}{x^4-6}$

[Horizontal]

Equation: $y=0$

Left: $\lim\limits_{x\to-\infty} h(x)=0$

Right: $\lim\limits_{x\to\infty} h(x)=0$

3. $p(x)=\dfrac{(3x-1)^2}{2x^2+3x+5}$

[Horizontal]

Equation: $y=\frac{9}{2}$

Left: $\lim\limits_{x\to-\infty} p(x)=\frac{9}{2}$

Right: $\lim\limits_{x\to\infty} p(x)=\frac{9}{2}$

4. $f(x)=\dfrac{x^2+x-6}{x-1}$

[Slant] $x-1=0$

$x=1$

Equation: $y=x+2$

Left: $\lim\limits_{x\to-\infty} f(x)=-\infty$

Right: $\lim\limits_{x\to\infty} f(x)=\infty$

1 | 1 1 −6
1 0

1 2 | −4

5. $k(x)=\dfrac{6x^3+2x+3}{2x^2-11x+4}$

[Slant]

Equation: $y=3x+16.5$

Left: $\lim\limits_{x\to-\infty} k(x)=-\infty$

Right: $\lim\limits_{x\to\infty} k(x)=\infty$

$$\begin{array}{r} 3x \\ 2x^2-11x+4 \overline{)\,6x^3+2x+3} \\ \underline{6x^3-33x^2+12x} \\ 33x^2-10x+3 \end{array}$$

$$\begin{array}{r} 3x+16.5 \\ 2x^2-11x+4 \overline{)\,6x^3+0x^2+2x+3} \\ \underline{6x^3-33x^2+12x} \\ +33x^2-10x+3 \end{array}$$

$x^2$

6. $f(x)=\dfrac{(x^2-1)(x+2)}{x-2}$

~~[Slant]~~ [Neither]

$x^3+2x^2-x-2$

Equation: $y=x^2+4x+7$

Left: $\lim\limits_{x\to-\infty} f(x)=\infty$

Right: $\lim\limits_{x\to\infty} f(x)=\infty$

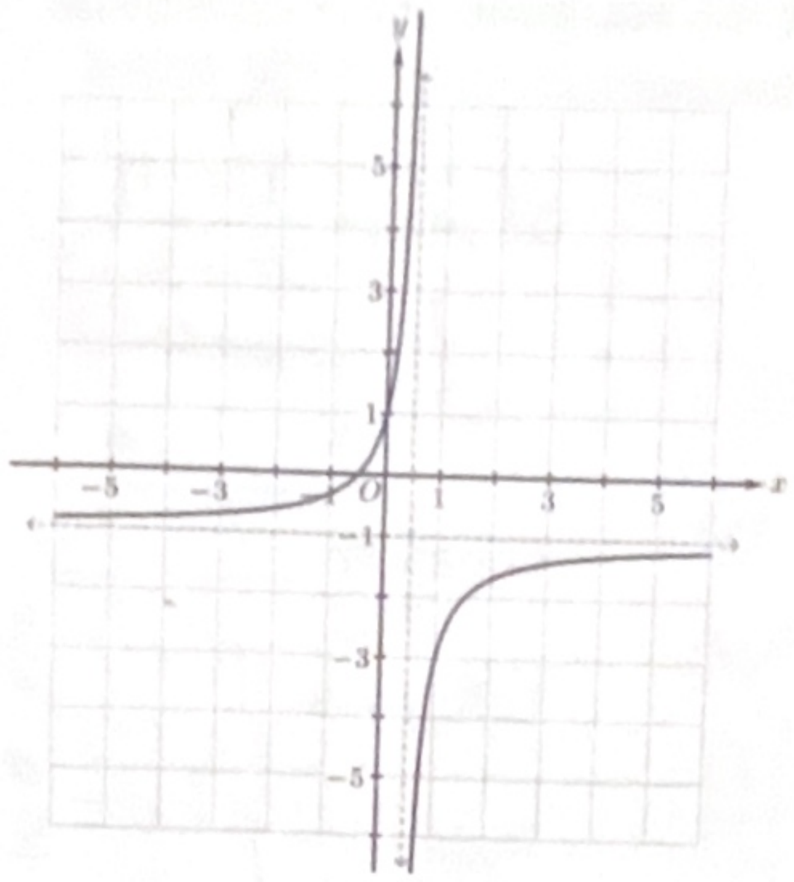
2 | 1 2 −1 −2
2 0 2
1 0 1 | 0

$x^2-1$

2 | 1 2 −1 −2
2 8 14
1 4 7 | 12

**Directions**:Write a limit statement describing the output values for the following graphs and ver
descriptions of the input values.

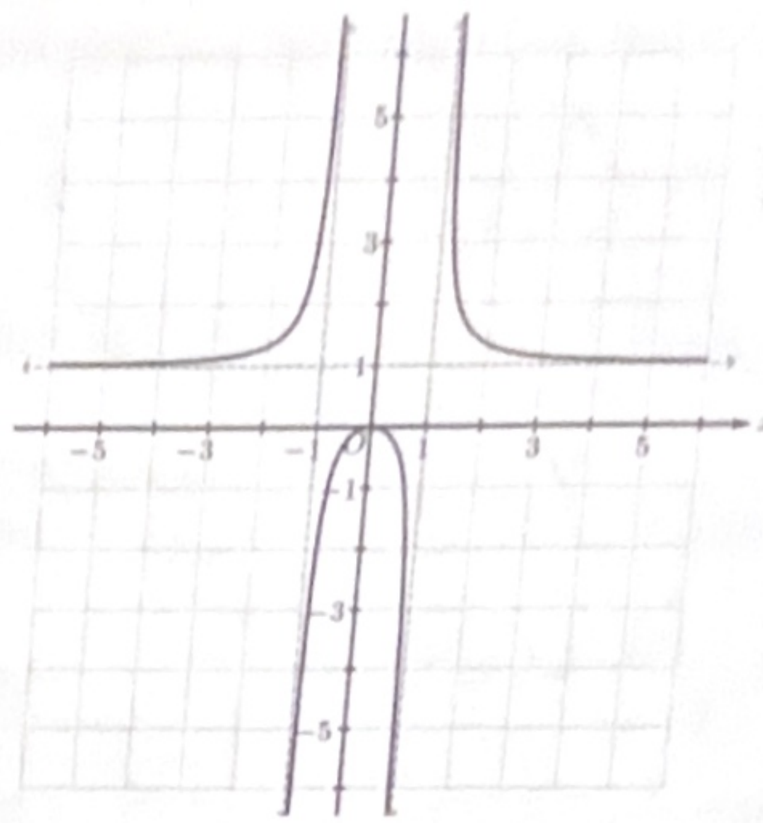
13. The input values decrease without bound



Graph of $f(x)$

13. Limit Statement: $\lim_{x \to -\infty} f(x) = -1$

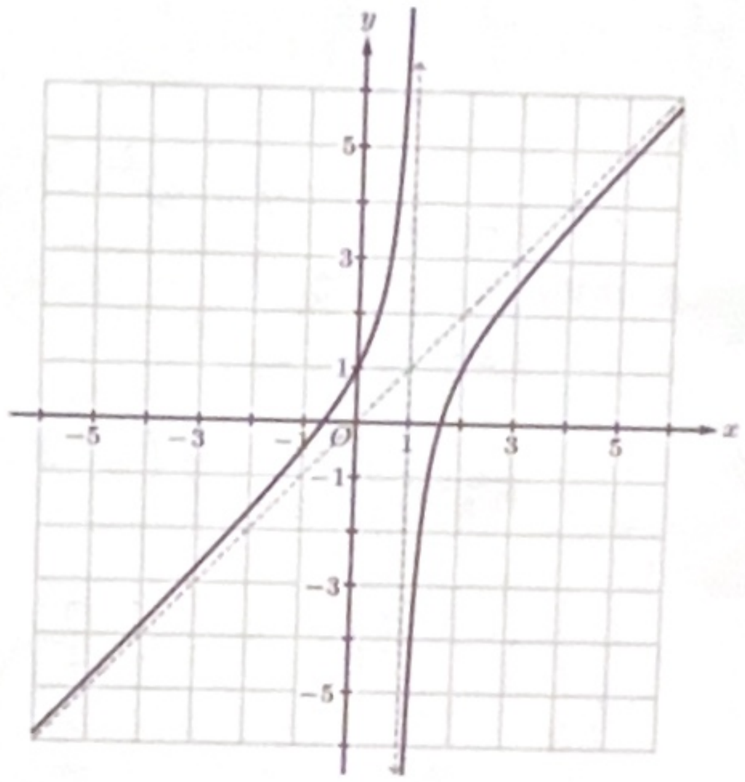
14. The input values increase without bo



Graph of $g(x)$

14. Limit Statement: $\lim_{x \to \infty} g(x) = 1$

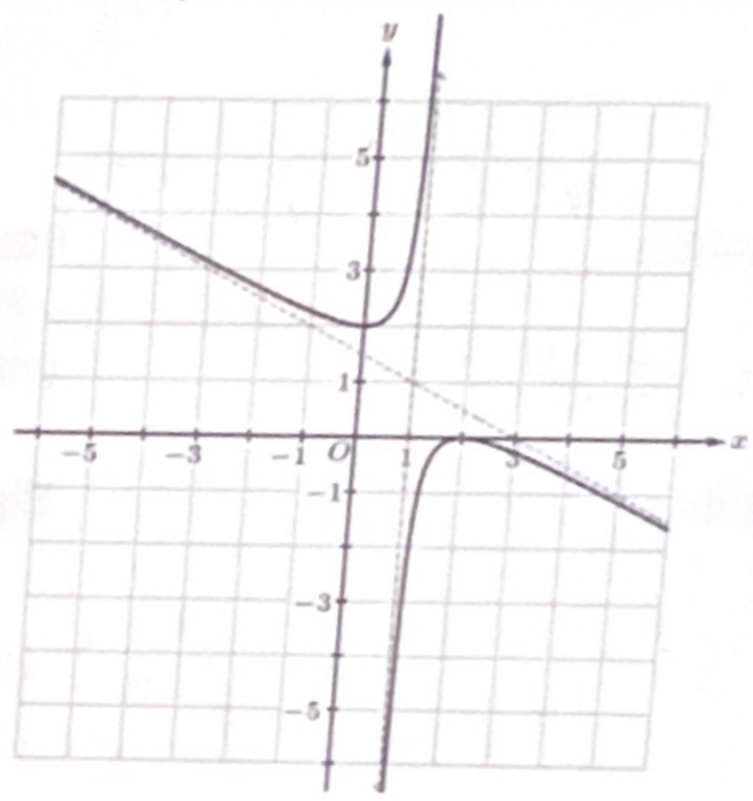
15. The input values increase without bound



Graph of $h(x)$

15. Limit Statement: $\lim_{x \to \infty} h(x) = \infty$

16. The input values decrease without bound



Graph of $k(x)$

16. Limit Statement: $\lim_{x \to -\infty} k(x) = -\infty$