Name Answer Key Date______________

Calc I H – 1.5/3.5 Practice Period______

Find any *vertical* asymptotes of: $f(x)=\dfrac{3x^2+2}{5x^3-40}=\dfrac{3x^2+2}{5(x^3-8)}$ $f(x)=\dfrac{3x^2+2}{5(x-2)(x^2+2x+4)}$ $\boxed{x=2}$	**Find** $\lim\limits_{x\to 2^-}\dfrac{3x^2+2}{5x^3-40}=-\infty$ **Find** $\lim\limits_{x\to 2^+}\dfrac{3x^2+2}{5x^3-40}=\infty$ **Find** $\lim\limits_{x\to 2}\dfrac{3x^2+2}{5x^3-40}$ DNE	**Find the *horizontal* asymptote of:** $f(x)=\dfrac{3x^2+2}{5x^3-40}$ $\boxed{y=0}$	**Find** $\lim\limits_{x\to\infty}\dfrac{3x^2+2}{5x^3-40}$ $\lim\limits_{x\to\infty}\dfrac{\frac{3}{x}+\frac{2}{x^3}}{5-\frac{40}{x^3}}$ $=0$
Find any *vertical* asymptotes of: $f(x)=\dfrac{5x^3-15}{3x+2}$ $=\dfrac{5(x^3-3)}{3x+2}$ $3x+2=0$ $\boxed{x=-2/3}$	**Find** $\lim\limits_{x\to -\frac{2}{3}^-}\dfrac{5x^3-15}{3x+2}=-\infty$ **Find** $\lim\limits_{x\to -\frac{2}{3}^+}\dfrac{5x^3-15}{3x+2}=-\infty$ **Find** $\lim\limits_{x\to -\frac{2}{3}}\dfrac{5x^3-15}{3x+2}$ DNE	**Find the *horizontal* asymptote of:** $f(x)=\dfrac{5x^3-15}{3x+2}$ None	**Find** $\lim\limits_{x\to -\infty}\dfrac{5x^3-15}{3x+2}$ $=\lim\limits_{x\to-\infty}\dfrac{5x^2-\frac{15}{x}}{3+\frac{2}{x}}$ $=\infty$
Find any *vertical* asymptotes of: $f(x)=\dfrac{3x^5+2x^2-1}{7x^5-7}$ $f(x)=\dfrac{3x^5+2x^2-1}{7(x^5-1)}$ $x^5-1=0$ $x^5=1$ $\boxed{x=1}$	**Find** $\lim\limits_{x\to 1^-}\dfrac{3x^5+2x^2-1}{7x^5-7}$ $=-\infty$ **Find** $\lim\limits_{x\to 1^+}\dfrac{3x^5+2x^2-1}{7x^5-7}$ $=\infty$ **Find** $\lim\limits_{x\to 1}\dfrac{3x^5+2x^2-1}{7x^5-7}$ DNE	**Find the *horizontal* asymptote of:** $f(x)=\dfrac{3x^5+2x^2-1}{7x^5-7}$ $\boxed{y=\frac{3}{7}}$	**Find** $\lim\limits_{x\to\infty}\dfrac{3x^5+2x^2-1}{7x^5-7}$ $\lim\limits_{x\to\infty}\dfrac{3+\frac{2}{x^3}-\frac{1}{x^5}}{7-\frac{7}{x^5}}$ $=\frac{3}{7}$

1. Describe in your own words what $\lim_{x\to-\infty} f(x) = 2$ means.

Left End behavior $\rightarrow$ Horizontal Asymptote at $y=2$

Find each limit, if possible. Try not to use the graphing calculator.

2. a) $\lim_{x\to\infty} \frac{3-2x}{3x^3-1} = \lim_{x\to\infty} \frac{\frac{3}{x^3} - \frac{2}{x^2}}{3 - \frac{1}{x^3}}$

$= \frac{0}{3} = 0$

b) $\lim_{x\to\infty} \frac{3-2x}{3x-1} = \lim_{x\to\infty} \frac{\frac{3}{x} - 2}{3 - \frac{1}{x}}$

$= \frac{-2}{3}$

c) $\lim_{x\to\infty} \frac{3-2x^2}{3x-1} = \lim_{x\to\infty} \frac{\frac{3}{x} - 2x}{3 - \frac{1}{x}}$

$= -\infty$

3. $\lim_{x\to-\infty} \frac{2x^5+4x^3+1}{10x^5-9x^2+x} = \lim_{x\to-\infty} \frac{2 + \frac{4}{x^2} + \frac{1}{x^5}}{10 - \frac{9}{x^3} + \frac{1}{x^4}}$

$= \frac{2}{10} = \frac{1}{5}$

4. $\lim_{x\to\infty} \left(6 + \frac{7}{x}\right) = \lim_{x\to\infty} \frac{6x+7}{x}$

$= \lim_{x\to\infty} \frac{6 + \frac{7}{x}}{1} = 6$

Use a graphing calculator to graph the function and identify any horizontal asymptotes.

5. $f(x) = \frac{3x}{\sqrt{x^2+2}}$

$\lim_{x\to-\infty} \frac{3x}{\sqrt{x^2+2}}$ "$\frac{3x}{|x|}$"

$= -3$

$\lim_{x\to\infty} \frac{3x}{\sqrt{x^2+2}}$ "$\frac{3x}{|x|}$"

$= 3$

HA $y = \pm 3$

$x^2+2 \neq 0$

No VA!

6. $g(x) = \frac{\sin(3x)}{x}$

$\lim_{x\to\pm\infty} \frac{\sin x}{x} = 0$

HA: $y=0$

$\lim_{x\to 0} 3\frac{\sin(3x)}{3x} = 3\cdot 1 = 3$

NO VA!

(hole at $x=0$)

7. $h(x) = \frac{|x|}{x+1}$

$\lim_{x\to-\infty} \frac{|x|}{x+1} = \lim_{x\to-\infty} \frac{\frac{|x|}{x}}{1+\frac{1}{x}} = -1$

$\lim_{x\to\infty} \frac{|x|}{x+1} = \lim_{x\to\infty} \frac{\frac{|x|}{x}}{1+\frac{1}{x}} = 1$

HA $y = \pm 1$

VA at $x=-1$

$\lim_{x\to -1} h(x)$ DNE