## 2.2 Limits to Infinity

Use the table on your calculator to investigate the limit numerically:

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

Definition of a Horizontal Asymptote:

If $\lim_{x\to\infty} f(x) = b$ *or* $\lim_{x\to-\infty} f(x) = b$ then there is a HA at y = b

Estimate: (remember this includes both the left and right hand limits!)

$$\lim_{x\to 0+}\frac{1}{x}=$$

$$\lim_{x\to 0-}\frac{1}{x}=$$

$$\lim_{x\to 0}\frac{1}{x}=$$

**2.2**

Definition of a Vertical Asymptote:

$$\lim_{x \to a^+} f(x) = \pm\infty$$

or

$$\lim_{x \to a^-} f(x) = \pm\infty$$

then there is a VA at x = a

## Summary of finding asymptotes

Horizontal Asymptotes:

1. If degree of the numerator is < the degree of the denominator: y=0
2. If degree of the numerator is = to the degree of the denominator: y=
3. If degree of the numerator is > the degree of the denominator: y=quotient

Vertical Asymptotes:

Domain restrictions

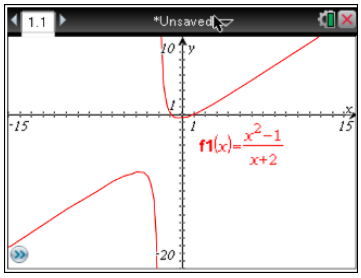
**2.2**

Power Function End Behavior Models:

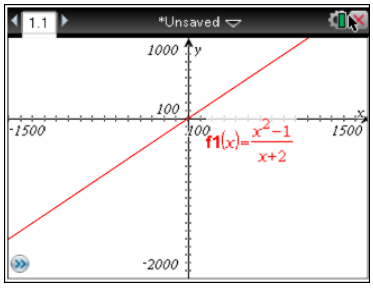
$$f(x) = \frac{x^2 + 1}{x + 2}$$

Graph f(x) using the following windows:

[-15,15] [-20,10]




[-1500, 1500] [-2000,1000]




what is an end-behavior model for f(x):

Find all asymptotes and describe them using limits. Find a power function that resembles f(x).

1. $f(x) = \dfrac{x+4}{x^2-9}$

2. $f(x) = \dfrac{2x^2+3x-1}{x^2-4}$

3. $f(x) = \cos\left(\dfrac{1}{x}\right)$

**2.2**

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

5. $f(x)=\dfrac{5x+\sin x}{x}$

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