

$$\lim_{x \rightarrow \pm\infty} f(x)$$

1. Find the positive horizontal asymptote(s) if they exist for each of the following:

$$\frac{x+2}{6x-4}$$

$$\frac{3x^2 - x - 2}{5x^2 + 4x + 1}$$

$$x^2 - x$$

$$\frac{\sqrt{2x^2 + 1}}{3x - 5}$$

$$\frac{x^2 + x}{3 - x}$$

$$\frac{x - 2}{x^2 + 1}$$

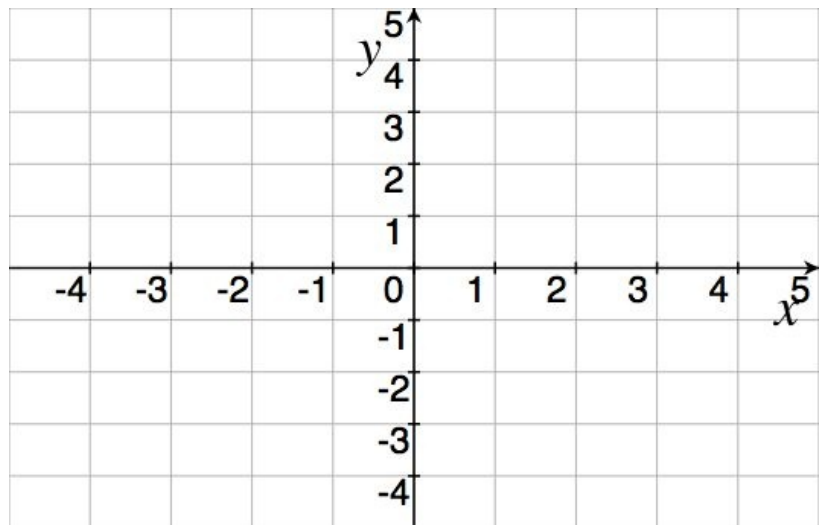
Check your answers by reading Examples 3, 10, 4, 11 & problem #17 from §2.6.

## Derivatives

2. Let  $f(x) = \frac{1}{x}$ .

(a) Find  $f'(2)$ .

(b) Find the equation of the line that is tangent to  $f$  at  $x = 2$ .



(c) Draw the graph of  $f$  and your line and verify your results.

3. Recall that average velocity is  $\frac{\text{total distance}}{\text{time it took}}$ . What do you think instantaneous velocity is?

4. If a grapefruit was dropped from a building, its distance from where it was dropped varies with time by the equation  $-4.9t^2$ . Use your answer from (3) (or look at §2.7) to find the instantaneous speed of the grapefruit one second after its release. *Hint: we've already done this computation today.*