Limits to $\pm\infty$

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

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

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

$$x^2-x$$

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

Check your answers by reading Examples 3, 9, & 4 from §2.6.

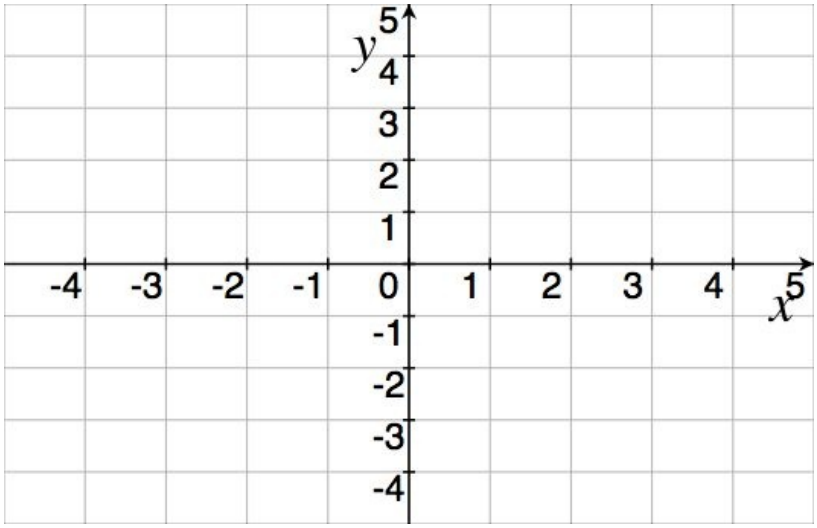
Derivatives

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, it's 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.*