Limits to ±∞

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

\[
\frac{x + 2}{6x - 4} \quad \frac{3x^2 - x - 2}{5x^2 + 4x + 1}
\]

\[
\frac{x^2 - x}{3x - 5} \quad \frac{\sqrt{2x^2 + 1}}{3x - 5}
\]
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. \textit{Hint: we’ve already done this computation today.}