

## Problem Squad #1

1. Compute the following limits:

(a)  $\lim_{x \rightarrow 2} \frac{2x^2 - 7x - 4}{x - 2}$

(b)  $\lim_{x \rightarrow -\infty} \frac{\sqrt{5x^4 + 6}}{x^2 - 3x}$

(c)  $\lim_{x \rightarrow 2} \frac{\sqrt{6 - x} - 2}{\sqrt{3 - x} - 1}$

*(this one is difficult...)*

2. Matt jumps straight up in the air with height function  $y(t) = t^3 - 3t^2 + t$ . Find two intervals  $[0, t_1]$  and  $[0, t_2]$  such that Matt's average velocity is 1 on each interval.

3. Is the function  $F(x) = \begin{cases} 7x - 10, & x < 2 \\ x^2, & x \geq 2 \end{cases}$  continuous for all  $x$ ? Justify your answer.

4. Find the equation of the tangent line to the curve  $f(t) = \frac{1}{2t+1}$  at  $t = 1$  using the definition of the derivative.