Math 171A | Differential Calculus
Fall 2009 | Quiz 6
Instructor: Shawn Rafalski | **Write your name on this quiz**

1. Answer the following question: What does the Mean Value Theorem say about the function $\frac{2x}{x+4}$ on the closed interval $[0,4]$? Also, find all the numbers c that satisfy the conclusion of the Mean Value Theorem.

$f(x) = \frac{2x}{x+4}$

MVT says there is at least one point $0 < c < 4$ where $f'(c) = \frac{f(4)-f(0)}{4-0} = \frac{1}{4}$.

$f'(x) = \frac{2(x+4)-2x}{(x+4)^2} = \frac{8}{(x+4)^2}$. $\frac{8}{(x+4)^2} = \frac{1}{4}$

$32 = (x+4)^2 = x^2+8x+16 \rightarrow x^2+8x-16=0$

$x = \frac{-8 \pm \sqrt{64-4\cdot(-16)}}{2} = \frac{-8 \pm \sqrt{128}}{2}$ $\nearrow \frac{-8+\sqrt{128}}{2} = -4+4\sqrt{2}$

$\rightarrow \frac{-8-\sqrt{128}}{2}$ not in $[0,4]$

2. Draw the graph of a function that has a vertical asymptote at $x = 2$, passes through the points $(0,0)$ and $(3,4)$, is concave up and increasing on $(-\infty, 2)$, and concave up and decreasing on $(2,\infty)$.