AP Calculus AB
Thursday, November 14, 2013

Example 2) Find all values between the x-intercepts for which Rolle's theorem holds for the roots of $f(x) = 3x^2 - x^4$. Confirm using your calculator.

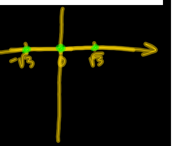
$3x^2 - x^4 = 0$

$x^2(3 - x^2) = 0$

$x = 0,\ 3 - x^2 = 0$

$x^2 = 3$

$x = \pm\sqrt{3}$



$f'(x) = 6x - 4x^3$

$6x - 4x^3 = 0$ The slope btw $(-\sqrt{3}, 0)$ & $(0,0)$ is 0.

$2x(3 - 2x^2) = 0$

$2x = 0 \quad 3 - 2x^2 = 0$

$x = 0 \quad 2x^2 = 3$

$x^2 = \frac{3}{2}$

$x = \pm\sqrt{\frac{3}{2}}$

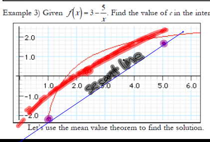
You are driving in a car traveling at 50 mph and you pass a police car . Four minutes later, you pass a second p
car and you are traveling at 50 mph. The distance between the two police cars is five miles. The second police
nails you for speeding. How can he prove that you were speeding?

$\frac{5\,mi}{4\,min} \cdot \frac{60\,min}{1\,hr}$

75mph

$\frac{50\,mi}{hr} \cdot \frac{1\,hr}{60\,min} = \frac{5/6\,mi}{min} = \frac{5\,mi}{6\,min}$

Example 3) Given $f(x) = 3 - \frac{5}{x}$. Find the value of c in the interval (1, 5) that satisfies the mean value the



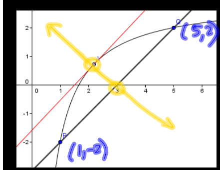
Let's use the mean value theorem to find the solution.

To the left, is the graph of the function.

Visually, what is the mean value theore
trying to find? Draw it in.

$f(1) = 3 - \frac{5}{1} = -2$

$f(5) = 3 - \frac{5}{5} = 2$



equation of se

$m = \frac{2 - -2}{5 - 1} =$

$y - 2 = 1(x - 5)$

$y - 2 = x - 5$

$y = x - 3$

x-int : (3,

$m_\perp = -1$

$y - 0 = -1(x - 3)$

$y = -x + 3$

Where does $y = -x + 3$ intersect f(

$-x + \cancel{3} = \cancel{3} - \frac{5}{x}$

$\frac{-x}{1} = \frac{-5}{x}$

$x^2 = 5$

$x = \pm\sqrt{5}$

how can we check this? We need to fi

eqn of tangent line @ $x = \sqrt{5}$.

$f(x) = 3 - 5x^{-1}$

$f'(x) = \frac{5}{x^2}$

$f'(\sqrt{5}) = \frac{5}{\sqrt{5}^2} = 1$

Will this work all of the time?

MVT:

slope of secant line → 1

$\frac{5}{x^2} = \frac{1}{\ }$