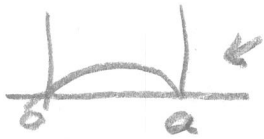
Mathematics 122

Quiz #22 Name: Key

You must show your work to get full credit.

1. Let b be a positive constant and let $f(x) = x(a - x)$ be defined for $0 \le x \le a$.

(a) Find the derivative $f'(x)$ *Hint:* It may be easier if rewrite $f(x)$ as $f(x) = ax - x^2$.



$y = f(x)$ is a parabola up-ency down

$f'(x) =$ $a - 2x$

(b) Find the critical points of $f(x)$. (That is the points, x, where $f'(x) = 0$.)

solving

$f'(a) = a - 2x = 0$

$-2x = -a$

$x = \frac{-a}{-2} = \frac{a}{2}$

Critical points are: $\frac{a}{2}$

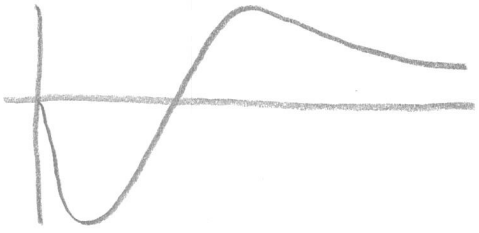
(c) What is the maximizer of $f(x)$? Maximizer is: $\frac{a}{2}$

(d) What is maximum of $f(x)$? Maximum is: $a^2/4$

$f\left(\frac{a}{2}\right) = \frac{a}{2}\left(a - \frac{a}{2}\right) = \frac{a}{2}\left(\frac{a}{2}\right) = \frac{a^2}{4}$

2. For $0 \le x \le 4$ let $f(x) = \dfrac{5x(x-1)}{1+x^4}$.

(a) Graph on your calculator and make a rough sketck of your graph here:



\Y1 = 5X(X-1)/(1+X^4)

Xmin = 0

X max = 4

(b) Use your calculator to find the following:

Maximum of $f(x)$ .63749 Maximizer of $f(x)$ 1.65415

Minimum of $f(x)$ −1.1889 Minimizer of $f(x)$ .45515