Math 1A (10:30am – 11:20am)
Quiz 6 Version D
Fri Feb 25, 2011

What month is your birthday ? ___ ___
What are the first 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your DeAnza ID number ? ___ ___

SCORE: ___ / 30 POINTS

NO CALCULATORS ALLOWED

SHOW PROPER ALGEBRAIC WORK AND USE PROPER NOTATION

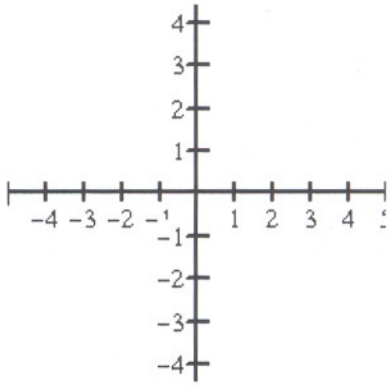
State the definition of "critical number". **SCORE: ___ / 2 POINTS**

a IS A CRITICAL NUMBER OF f IF a IS IN THE DOMAIN OF f ½
½
AND $f'(a)=0$ OR $f'(a)$ DOES NOT EXIST ½
½

SUBTRACT ½ FOR WRONG "IF" "AND" "OR"

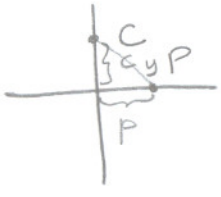
Sketch the graph of a function which satisfies all the following properties, or explain **very briefly** why no such function exists. **SCORE: ___ / 2 POINTS**

f is continuous on $[-5, 5]$, f has a local maximum at $x = 0$,
f has a local minimum at $x = -2$, f has a local and global minimum at $x = 3$,
and f has no global maximum on $[-5, 5]$.



NO SUCH f. EXTREME VALUE THEOREM ½ SAYS EVERY CONTINUOUS FUNCTION ON A ½ CLOSED INTERVAL HAS BOTH A GLOBAL MAX & MIN. ½

Chris is driving **north** along Stelling Road at 22 miles per hour, and Pat is driving **west** along Stevens Creek Boulevard at 38 miles per hour. If Chris is currently 2 miles **north** of the intersection of Stelling Road and Stevens Creek Boulevard, and Pat is currently 1 mile **east** of the intersection, how quickly is the distance between them changing ? Are they getting closer together or farther apart ? **SCORE: ___ / 10 POINTS**



1 $\frac{dc}{dt} = +22 \text{ mi/hr}$, $\frac{dp}{dt} = -38 \text{ mi/hr}$, 1½

WANT $\frac{dy}{dt}$ WHEN $c = 2\text{ mi}$, $p = 1\text{ mi}$, $y = \sqrt{5}\text{ mi}$

2 $y^2 = c^2 + p^2$,

1 $2y\frac{dy}{dt} = 2c\frac{dc}{dt} + 2p\frac{dp}{dt}$,

$\sqrt{5}\text{ mi}\ \frac{dy}{dt} = 2\text{ mi}\left(22\frac{\text{mi}}{\text{hr}}\right) + 1\text{ mi}\left(-38\frac{\text{mi}}{\text{hr}}\right)$
½ ½ ½ ½ ½

$\frac{dy}{dt} = \frac{6}{\sqrt{5}}\frac{\text{mi}}{\text{hr}}$
½ ½

(GETTING FARTHER APART) 1

Find the global extrema of $f(x) = x^{\frac{2}{5}}(2x-7)$ on the interval $[-1, 3]$.

SCORE: ___ / 6 POINTS

$f(x) = 2x^{\frac{7}{5}} - 7x^{\frac{2}{5}}$

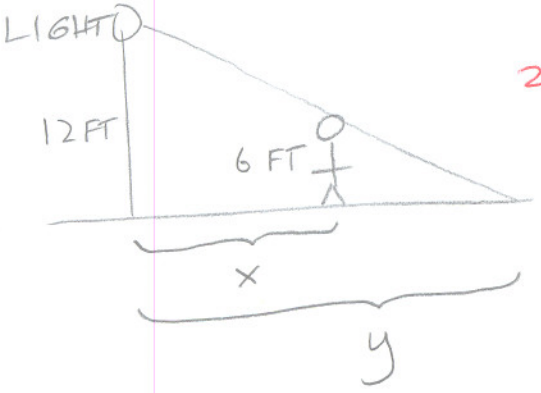
$f'(x) = \frac{14}{5}x^{\frac{2}{5}} - \frac{14}{5}x^{-\frac{3}{5}}$ (1) DNE @ $x = 0$, $\in [-1, 3]$ (1)

$= \frac{14}{5}x^{-\frac{3}{5}}(x-1) = 0$ @ $x = 1$ (1)

x	$f(x)$	
-1	-9	$\leftarrow$ MIN ($\frac{1}{2}$) ($\frac{1}{2}$)
0	0	$\leftarrow$ MAX ($\frac{1}{2}$) ($\frac{1}{2}$)
1	-5	($\frac{1}{2}$)
3	$-3^{\frac{2}{5}} = -\sqrt[5]{9}$	($\frac{1}{2}$)

A street light is mounted at the top of a 12 foot tall pole. A 6 foot tall woman walks in a straight line away from the pole at 3 feet per second. How fast is the tip of the woman's shadow moving when she is 20 feet from the pole ?

SCORE: ___ / 10 POINTS



(2) $\frac{dx}{dt} = 3$ ft/s

WANT $\frac{dy}{dt}$ WHEN $x = 20$ ft (1)

(3) $\frac{y-x}{6\text{ ft}} = \frac{y}{12\text{ ft}}$

$12y - 12x = 6y$

$y = 2x$

(2) $\frac{dy}{dt} = 2\frac{dx}{dt}$

$= 2\left(3\ \frac{\text{ft}}{\text{s}}\right)$ (1)

$= 6\ \frac{\text{ft}}{\text{s}}$ ($\frac{1}{2}$) ($\frac{1}{2}$)