Math 1A (7:30am – 8:20am)
Quiz 7 Version A
Fri Mar 4, 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 "concave down". **SCORE: ___ / 2 POINTS**

f IS CONCAVE DOWN ON (a, b)
IF f' IS DECREASING ON (a, b)

State the Mean Value Theorem. **SCORE: ___ / 2 POINTS**

IF f IS CONTINUOUS ON [a, b] AND DIFFERENTIABLE ON (a, b)
THEN THERE EXISTS A VALUE $c \in (a,b)$ SUCH THAT $f'(c) = \frac{f(b)-f(a)}{b-a}$

Let $f(x) = 9 + 10x^4 - 2x^5$. **SCORE: ___ / 10 POINTS**

[a] Find all critical numbers of f.

$f'(x) = 40x^3 - 10x^4$ 1
$= 10x^3(4-x) = 0$ @ $x = 0, 4$
1 1

[b] For each critical number, determine what the Second Derivative Test tells you about that critical number.

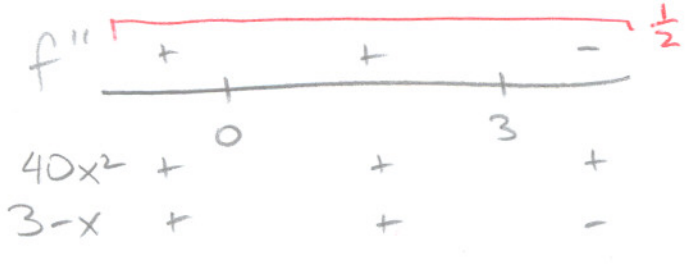
$f''(x) = 120x^2 - 40x^3$ 1
$= 40x^2(3-x)$

½ $f''(0) = 0$ → NO CONCLUSION 1

½ $f''(4) < 0$ → LOCAL MAX @ $x = 4$ 1

[c] Find the inflection points of f.

$f'' = 0$ @ $x = 0, 3$
1 1



½

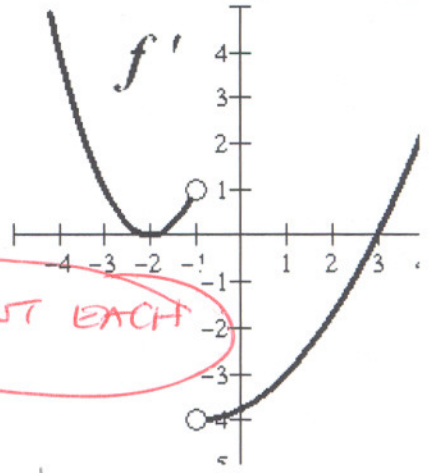
I.P. @ $x = 3$ ½

$40x^2$ + + +
$3-x$ + + −

NO POINTS IF YOU SAID BOTH $x = 0, 3$

The graph of the derivative f' of a **continuous** function f is shown on the right.

SCORE: ___ / 10 POINTS



[a] Write "**OK**" if you understand that the graph shows f' and **NOT** f, but that all the questions below are about f and **NOT** f', and that you must explain your answers to get any credit.

OK

[b] Is f increasing or decreasing on the interval $[0, 2]$? Explain your answer(s) **very briefly**.

$f' < 0$ → f DECREASING.

1 POINT EACH

[c] Find the x – coordinates of all critical numbers of f. Explain your answer(s) **very briefly**.

$f' = 0$ @ $x = -2, 3$. f' DNE @ $x = -1$.

[d] Find the x – coordinates of all local maxima of f. Explain your answer(s) **very briefly**.

f' CHANGES FROM POSITIVE TO NEGATIVE @ $x = -1$.

[e] Is f concave up or down on the interval $[-4, -2]$? Explain your answer(s) **very briefly**.

f' DECREASING → f CONCAVE DOWN.

[f] Find the x – coordinates of all inflection points of f. Explain your answer(s) **very briefly**.

f' CHANGES FROM DECREASING TO INCREASING @ $x = -2$

Does Rolle's Theorem apply to the function $f(x) = \sqrt[3]{x} - \frac{x}{4}$ on the interval $[-8, 8]$?

SCORE: ___ / 3 POINTS

If yes, find the value of c guaranteed by Rolle's Theorem. If no, explain why not.

$f'(x) = \frac{1}{3}x^{-\frac{2}{3}} - \frac{1}{4}$, DNE @ $x = 0$, ½

f IS NOT DIFFERENTIABLE, ON $[-8, 8]$, 1

SO ROLLE'S THEOREM DOES NOT APPLY. 1

Sketch the graph of a **continuous** function that satisfies all the given conditions.

SCORE: ___ / 3 POINTS

$f'(x) > 0$ if $x < 2$,
$f'(x) < 0$ if $x > 2$,
$f''(x) > 0$ if $|x| > 2$,
$f''(x) < 0$ if $|x| < 2$