Math 1A (9:30am – 10:20am)
Quiz 3 Version Y
Fri Apr 22, 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 (USING THE THEOREMS IN 5.3 & 5.4)
USE PROPER NOTATION & SIMPLIFY ALL ANSWERS WHERE REASONABLE

State both parts of the Fundamental Theorem of Calculus. **SCORE: ___ / 4 POINTS**
Use complete sentences and proper algebra & English as shown in class.

SEE 7:30 VERSION L

The velocity of an object at time t (in seconds) is given by $v(t) = 3 - 3t^2$ meters per second. **SCORE: ___ / 5 POINTS**

[a] Find the displacement of the object from $t = 0$ to $t = 5$. Specify the units of your answer.

$\int_0^5 (3-3t^2)\,dt = (3t-t^3)\Big|_0^5 = 15-125 = -110\text{ m}$ (1, 1, $\frac{1}{2}$, $\frac{1}{4}$)

[b] Find the total distance travelled by the object from $t = 0$ to $t = 5$. Specify the units of your answer.

$\int_0^5 |3-3t^2|\,dt = \int_0^1 (3-3t^2)\,dt + \int_1^5 -(3-3t^2)\,dt$ $1\frac{1}{2}$

$= (3t-t^3)\Big|_0^1 + -(3t-t^3)\Big|_1^5$

$= (3-1) + -[(15-125)-(3-1)] = 114\text{ m}$ ($\frac{1}{2}$, $\frac{1}{4}$)

Find $\int_1^2 \frac{(1-r)^2}{2r^3}\,dr$. **SCORE: ___ / 5 POINTS**

$= \int_1^2 \frac{1-2r+r^2}{2r^3}\,dr$

$= \int_1^2 \left(\frac{1}{2}r^{-3} - r^{-2} + \frac{1}{2}r^{-1}\right)dr$ 2

$= \left(-\frac{1}{4}r^{-2} + r^{-1} + \frac{1}{2}\ln|r|\right)\Big|_1^2$ ← 2 POINTS IF ALL 3 TERMS CORRECT; 1 ANY 2; 0 0 OR 1

$= \left(-\frac{1}{16} + \frac{1}{2} + \frac{1}{2}\ln 2\right) - \left(-\frac{1}{4} + 1\right)$

$= -\frac{5}{16} + \frac{1}{2}\ln 2$ 1

MULTIPLE CHOICE: CIRCLE THE CORRECT ANSWER **SCORE: ___ / 3 POINTS**

If you write $\lim_{n\to\infty}\sum_{k=1}^{n}\frac{3}{n}\left(1+\frac{3k}{n}\right)^{-4}$ as a definite integral, the value of the integral (and the limit) is $\int_1^4 x^{-4}dx = -\frac{1}{3}x^{-3}\Big|_1^4$

[a] $\frac{3}{8}$ [b] $\frac{65}{192}$ [c] $-\frac{1}{3}$ [d] $\frac{5}{16}$ [e] $\frac{21}{64}$ [f] none of the above

Find $\int (x^3+x)\sin(x^4+2x^2-5)\,dx$. **SCORE: ___ / 4 POINTS**

$u = x^4+2x^2-5$ $\frac{1}{2}$

$du = (4x^3+4x)\,dx$

$\frac{1}{4}du = (x^3+x)\,dx$ $\frac{1}{2}$ ← NEED ONLY ONE OF THESE TWO LINES TO GET THAT $\frac{1}{2}$ POINT

$\int \frac{1}{4}\sin u\,du = -\frac{1}{4}\cos u + C = -\frac{1}{4}\cos(x^4+2x^2-5)+C$

1 1 $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{4}$

Find the derivative of $\int_{\sinh x}^{x^4}\sqrt{t^2+1}\,dt$. **Show each step CLEARLY as demonstrated in class.** **SCORE: ___ / 4 POINTS**

$\frac{d}{dx}\int_{\sinh x}^{x^4}\sqrt{t^2+1}\,dt = \frac{d}{dx}\left[\int_{\sinh x}^{0}\sqrt{t^2+1}\,dt + \int_0^{x^4}\sqrt{t^2+1}\,dt\right]$ 1

$= \frac{d}{dx}\left[-\int_0^{\sinh x}\sqrt{t^2+1}\,dt + \int_0^{x^4}\sqrt{t^2+1}\,dt\right]$ $\frac{1}{2}$

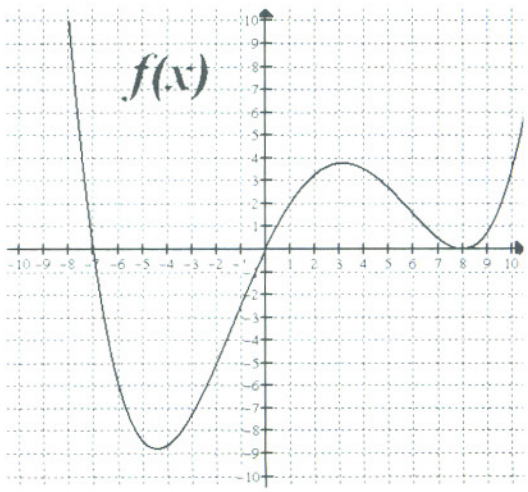
$= -\sqrt{\sinh^2 x+1}\cdot\cosh x + \sqrt{x^8+1}\cdot 4x^3$

$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

$= 4x^3\sqrt{x^8+1} - \cosh^2 x$

$\frac{1}{2}$

The graph of f is shown on the right. Let $g(x) = \int_{-1}^{x} f(t)\,dt$. **SCORE: ___ / 5 POINTS**



[a] Find $g'(-2)$. **Justify your answer VERY BRIEFLY.**

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

[b] At what value(s) of x does g have a local maximum (maxima)?
Explain very briefly.

1 $g'(=f)$ CHANGES FROM >0 TO <0

1 AT $x=-7$ ★ SUBTRACT $\frac{1}{2}$ POINT FOR EACH ADDITIONAL X-VALUE LISTED

[c] Is g concave up or concave down on the interval $(6,8)$?
Explain very briefly. Answers without explanations will earn no points.

$1\frac{1}{2}$ $g'(=f)$ IS DECREASING ON $(6,8)$

SO g IS CONCAVE DOWN ← NO PARTIAL CREDIT IF EXPLANATION MISSING