Math 1B (9:30am – 10:20am)
Quiz 3 Version C
Fri Apr 23, 2010

SCORE: ___ / 30 POINTS

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 social security number ? ___ ___
[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER, USE YOUR STUDENT ID NUMBER]

NO CALCULATORS ALLOWED
YOU MUST SHOW PROPER CALCULUS LEVEL WORK

State the definition of "definite integral". **[Same question and answer as quiz #2]** **SCORE: ___ / 2 POINTS**

SEE 7:30 VERSION A KEY

State the Net Change Theorem. **SCORE: ___ / 2 POINTS**

SEE 7:30 VERSION B KEY

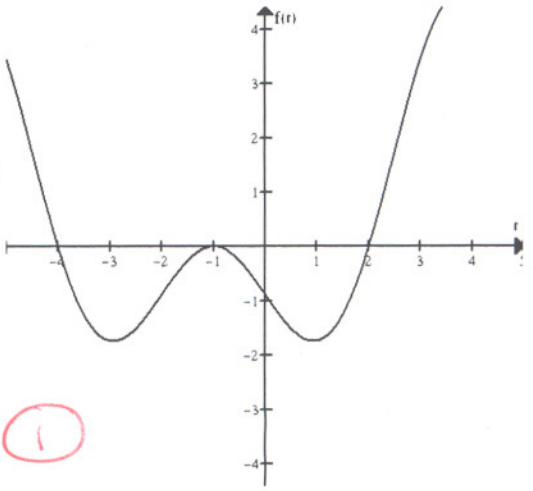
If $c(l)$ is the number of calories you were burning per mile during a marathon after you had run l miles of it, **SCORE: ___ / 2 POINTS**

what is the practical meaning of $\int_2^6 c(l)\,dl = 500$? Give the units for each number in your answer.

Your answer should make sense to a 10 year old who has never heard of calculus before.

YOU BURNED 500 CALORIES (RUNNING) BETWEEN THE 2 MILE POINT ON A MARATHON AND THE 6 MILE POINT.

The graph of f is shown below. Let $g(x) = \int_{-2}^{x} f(t)\,dt$. **SCORE: ___ / 6 POINTS**



[a] On what intervals is g concave up ? Explain briefly.

$g' = f$ (1) IS INCREASING (1) ON $[-3,-1]$ (1) AND $[1,\infty]$ (1)

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

$g' = f$ CHANGES FROM NEGATIVE TO POSITIVE (1) AT $x = 2$ (1)

The velocity of an object at time t seconds is $v(t) = 6 - 3\sqrt{t}$ feet per second. Find the distance travelled by the object over the interval $[1, 9]$. **SCORE: ___ / 6 POINTS**

SEE 7:30 VERSION A KEY

Suppose f' is continuous. If $f(-1) = 17$ and $\int_{-1}^{2} f'(t)\,dt = 23$, find $f(2)$. **SCORE: ___ / 2 POINTS**

$\int_{-1}^{2} f'(t)\,dt = f(2) - f(-1)$

$23 = f(2) - 17$

$f(2) = 40$ (1)

(1) IF YOU HAVE EITHER ONE

Find the derivative of the function $g(x) = \int_{\sqrt{x}}^{\tan^{-1} x} \ln(1+t^2)\,dt$. **SCORE: ___ / 5 POINTS**

$g'(x) = \frac{d}{dx}\int_{\sqrt{x}}^{\tan^{-1}x} \ln(1+t^2)\,dt$

$= \frac{d}{dx}\int_{\sqrt{x}}^{0} \ln(1+t^2)\,dt + \frac{d}{dx}\int_{0}^{\tan^{-1}x} \ln(1+t^2)\,dt$ (1)

$= -\frac{d}{dx}\int_{0}^{\sqrt{x}} \ln(1+t^2)\,dt + \frac{d}{dx}\int_{0}^{\tan^{-1}x} \ln(1+t^2)\,dt$ (1)

$= -\frac{d}{d\sqrt{x}}\int_{0}^{\sqrt{x}} \ln(1+t^2)\,dt \cdot \frac{d\sqrt{x}}{dx} + \frac{d}{d\tan^{-1}x}\int_{0}^{\tan^{-1}x} \ln(1+t^2)\,dt \cdot \frac{d\tan^{-1}x}{dx}$

$= -\ln(1+x) \cdot \frac{1}{2\sqrt{x}} + \ln(1+(\tan^{-1}x)^2) \cdot \frac{1}{1+x^2}$ ($\frac{1}{2}$, $\frac{1}{2}$, 1, 1)

$= -\frac{\ln(1+x)}{2\sqrt{x}} + \frac{\ln(1+(\tan^{-1}x)^2)}{1+x^2}$ ($\frac{1}{2}$)

Evaluate $\int \sec^3 x \tan x\,dx$. **SCORE: ___ / 5 POINTS**

$\int \sec^2 x \sec x \tan x\,dx$

(1) $u = \sec x$

$\frac{du}{dx} = \sec x \tan x$

$du = \sec x \tan x\,dx$ (1)

$= \int u^2\,du$ (1)

$= \frac{1}{3}u^3 + C$ (1)

$= \frac{1}{3}\sec^3 x + C$ ($\frac{1}{2}$, $\frac{1}{2}$)