Math 1B (7:30am – 8:20am)
Quiz 3 Version B
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**

IF F' IS CONTINUOUS ON $[a,b]$
THEN $\int_a^b F'(x)\,dx = F(b) - F(a)$

If $g(h)$ is the number of pounds you gained per inch you grew in height when you were h inches tall, and $g(h)$ is measured in pounds per inch, what is the practical meaning of $\int_{60}^{72} g(h)\,dh = 42$? Give the units for each number in your answer. **SCORE: ___ / 2 POINTS**

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

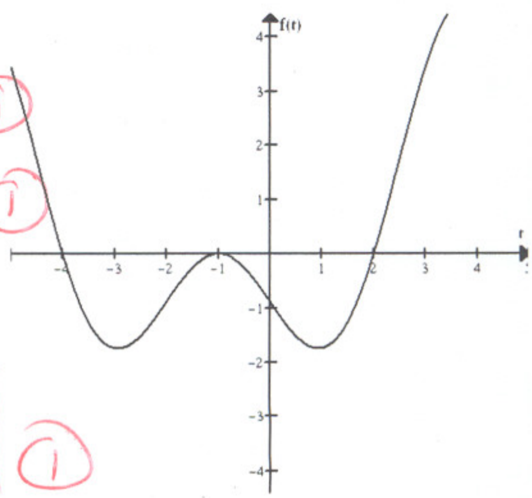
YOU GAINED 42 POUNDS WHEN YOU GREW FROM 60 INCHES TALL TO 72 INCHES TALL

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 down ? Explain briefly.

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

1 1 1 1



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

$g' = f$ CHANGES FROM POSITIVE TO NEGATIVE AT $x = -4$

1 1

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

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

$23 = 17 - f(-1)$

1 IF YOU HAVE EITHER ONE

$f(-1) = -6$ 1

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

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

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

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

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

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

$= \ln(1+\cos^2 x)\sin x + \frac{\ln(1+x)}{2\sqrt{x}}$

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

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

1 $u = \sec x$

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

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

$\int \sec^4 x \sec x \tan x\,dx$

$= \int u^4\,du$ 1

1 $= \frac{1}{5}u^5 + C$

$\frac{1}{2}$ $= \frac{1}{5}\sec^5 x + C$ $\frac{1}{2}$