Math 1B (9:30am – 10:20am)
Quiz 1 Version D
Fri Apr 16, 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". **SCORE: ___ / 2 POINTS**

SEE 7:30 VERSION A KEY

State the Fundamental Theorem of Calculus Part 1. **SCORE: ___ / 2 POINTS**

SEE 7:30 VERSION A KEY

Use the definition of the definite integral, and right endpoints, to evaluate $\int_{-3}^{1} (2+4x)\,dx$. **SCORE: ___ / 6 POINTS**

$\lim_{n\to\infty} \sum_{i=1}^{n} f(-3+\frac{4i}{n})\frac{4}{n}$

$= \lim_{n\to\infty} \sum_{i=1}^{n} (2+4(-3+\frac{4i}{n}))\frac{4}{n}$ (1) (1) (1)

$= \lim_{n\to\infty} \frac{4}{n} \sum_{i=1}^{n} (-10+\frac{16i}{n})$

$= \lim_{n\to\infty} \frac{4}{n} \left(\sum_{i=1}^{n} -10 + \frac{16}{n}\sum_{i=1}^{n} i\right)$ ($\frac{1}{2}$) ($\frac{1}{2}$)

$= \lim_{n\to\infty} \frac{4}{n} \left(-10n + \frac{16}{n}\cdot\frac{n(n+1)}{2}\right)$ ($\frac{1}{2}$) ($\frac{1}{2}$)

$= \lim_{n\to\infty} 4\left(-10+\frac{8(n+1)}{n}\right)$ ($\frac{1}{2}$)

$= 4(-10+8)$

$= -8$ ($\frac{1}{2}$)

Suppose $\int_{2}^{3} \arctan x\,dx = 1.2$, $\int_{3}^{6} \arctan x\,dx = 4.0$ and $\int_{4}^{6} \arctan x\,dx = 2.7$. **SCORE: ___ / 8 POINTS**

[a] Find $\int_{6}^{4} (3-5\arctan x)\,dx$.

$= \int_{6}^{4} 3\,dx - 5\int_{6}^{4} \arctan x\,dx$ ($\frac{1}{2}$) (1)

$= 3(4-6) + 5\int_{4}^{6} \arctan x\,dx$ ($\frac{1}{2}$)

$= -6+5(2.7)$ (1)

$= 7.5$ (1)

[b] Find $\int_{2}^{4} \arctan x\,dx$. **HINT: Find** $\int_{2}^{6} \arctan x\,dx$.

$= \int_{2}^{3} \arctan x\,dx + \int_{3}^{6} \arctan x\,dx$ (1)
$+ \int_{6}^{4} \arctan x\,dx$ ($\frac{1}{2}$)

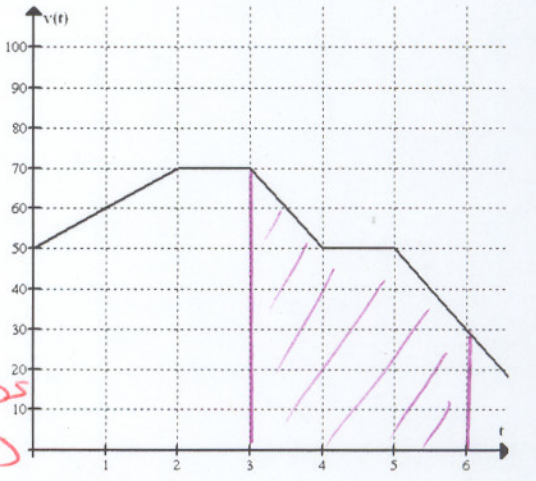
$= 1.2 + 4.0 - \int_{4}^{6} \arctan x\,dx$ ($\frac{1}{2}$)

$= 5.2 - 2.7 = 2.5$ (1) (1)

FOR THE FOLLOWING QUESTIONS, YOU MUST SHOW HOW YOU FOUND YOUR ANSWERS. HOWEVER, YOU DO NOT HAVE TO USE FORMAL CALCULUS NOTATION.

The velocity of a car as a function of time $v(t)$ is shown in the graph below. **SCORE: ___ / 3 POINTS**

Find the total distance travelled by the car from $t = 3$ to $t = 6$.



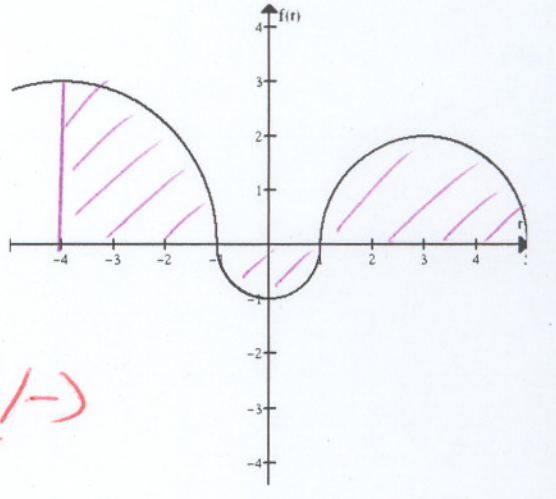
$\frac{1}{2}(70+50)1 + 50(1) + \frac{1}{2}(50+30)1$ (2)

$= 60 + 50 + 40$

$= 150$ (1)

↑ CAN USE ANY CALCULATION WHICH CORRESPONDS TO PURPLE SHADED AREA

The graph of $f(t)$ shown below consists of 3 semicircles of radii 3, 1 and 2. Let $g(x) = \int_{-4}^{x} f(t)\,dt$. **SCORE: ___ / 6 POINTS**



[a] Find $g(5)$.

(1) $\frac{1}{4}\pi(3)^2 - \frac{1}{2}\pi(1)^2 + \frac{1}{2}\pi(2)^2$ (1) (1)

$= \frac{9\pi}{4} - \frac{\pi}{2} + 2\pi$

$= \frac{15\pi}{4}$ (1) ← NO PARTIAL CREDIT IF THIS IS WRONG DUE TO SIGN (+/−) ERROR ABOVE

[b] Find $g'(0)$.

$g'(0) = f(0) = -1$ (1) (1)

The graph of $f(x)$ is shown below. Estimate $\int_{3}^{9} f(x)\,dx$ using 3 subintervals with midpoints. **SCORE: ___ / 4 POINTS**

$\Delta x = \frac{9-3}{3} = 2$ (1/2)

INTERVALS = $[3,5], [5,7], [7,9]$

MIDPOINTS = 4, 6, 8

$f(4)\Delta x + f(6)\Delta x + f(8)\Delta x$

(1) $= 7(2) + 2(2) + 1(2)$ (1) (1)

$= 20$ (1/2)