Math 1B (7:30am – 8:20am)
Quiz 1 Version B
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 $\int_{-1}^{3} (1+4x)\,dx$. **SCORE: ___ / 6 POINTS**

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

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

$= \lim_{n\to\infty} \frac{4}{n} \sum_{i=1}^{n} \left(-3+\frac{16i}{n}\right)$

$= \lim_{n\to\infty} \frac{4}{n} \left(\sum_{i=1}^{n} -3 + \frac{16}{n}\sum_{i=1}^{n} i\right)$ (1/2) (1/2)

$= \lim_{n\to\infty} \frac{4}{n} \left(-3n + \frac{16}{n}\cdot\frac{n(n+1)}{2}\right)$ (1/2) (1/2)

$= \lim_{n\to\infty} 4\left(-3+\frac{8(n+1)}{n}\right)$ (1/2)

$= 4(-3+8)$

$= 20$ (1/2)

Suppose $\int_1^2 \arctan x\,dx = 1.0$, $\int_2^5 \arctan x\,dx = 3.8$ and $\int_3^5 \arctan x\,dx = 2.6$. **SCORE: ___ / 8 POINTS**

[a] Find $\int_5^3 (6-4\arctan x)\,dx$.

$= \int_5^3 6\,dx - 4\int_5^3 \arctan x\,dx$ (1/2) (1)

$= 6(3-5) + 4\int_3^5 \arctan x\,dx$ (1/2)

$= -12 + 4(2.6)$ (1)

$= -1.6$ (1)

[b] Find $\int_1^3 \arctan x\,dx$. **HINT: Find** $\int_1^5 \arctan x\,dx$.

$= \int_1^2 \arctan x\,dx + \int_2^5 \arctan x\,dx$ (1)

$+ \int_5^3 \arctan x\,dx$ (1/2)

$= 1.0 + 3.8 - \int_3^5 \arctan x\,dx$ (1/2)

$= 4.8 - 2.6 = 2.2$ (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**

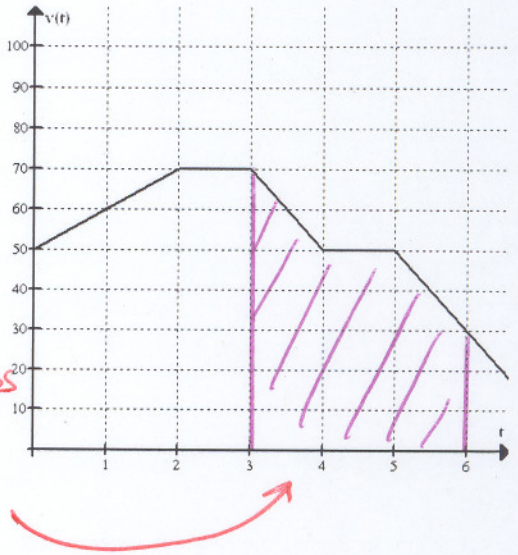
Find the total distance travelled by the car from $t = 3$ to $t = 6$.

$\frac{1}{2}(70+50)1 + 50(1) + \frac{1}{2}(50+30)1$ (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 $g(3)$.

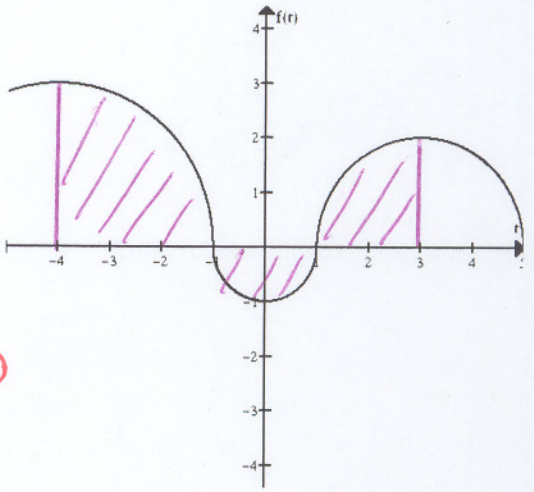
(1) $\frac{1}{4}\pi(3)^2 - \frac{1}{2}\pi(1)^2 + \frac{1}{4}\pi(2)^2$ (1) (1)

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

$= \frac{11\pi}{4}$ (1) ← NO PARTIAL CREDIT IF THIS IS WRONG DUE TO SIGN (+/−) ERROR ABOVE

[b] Find $g'(3)$.

$g'(3) = f(3) = 2$ (1) (1)



The graph of $f(x)$ is shown below. Estimate $\int_{1}^{7} f(x)\,dx$ using 3 subintervals with midpoints. **SCORE: ___ / 4 POINTS**

$\Delta x = \frac{7-1}{3} = 2$ (½)

INTERVALS = [1, 3], [3, 5], [5, 7]

MIDPOINTS = 2, 4, 6

$f(2)\Delta x + f(4)\Delta x + f(6)\Delta x$

(1) $10(2) + 7(2) + 2(2)$ (1) (1)

$= 38$ (½)