Math 1B
Quiz 2
Fri Apr 18, 2008

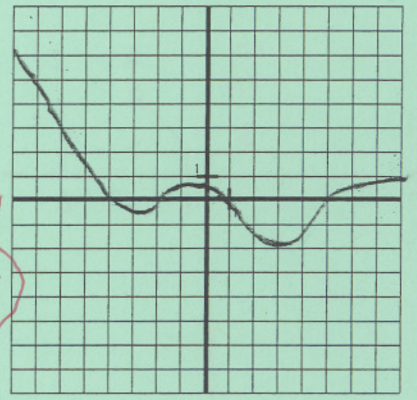
What day of the month is your birthday ? __ __
What are the last 2 digits of your address ? __ __
What are the last 2 digits of your zip code ? __ __

THIS IS A NO CALCULATOR QUIZ

SUBTRACT $\frac{1}{2}$ POINT EACH TIME YOU DON'T WRITE dx

[6 POINTS] The graph of $y = f(x)$ is shown to the right.

$y = f(x)$
WINDOW [–8, 8] × [–8, 8]



(a) Write the **total** area between the x-axis and $y = f(x)$ as an integral or a sum/difference of integrals.
DO NOT USE ABSOLUTE VALUES (ERIK'S TRICK) OR ROOTS OF POWERS (ANUJ'S TRICK).

$$\int_{-8}^{-4} f(x)\,dx - \int_{-4}^{-2} f(x)\,dx + \int_{-2}^{1} f(x)dx - \int_{1}^{5} f(x)\,dx + \int_{5}^{8} f(x)\,dx$$

1 1 1

(b) Determine whether $\int_1^8 f(x)dx$ is positive or negative. **Explain briefly.**

NEGATIVE 2

AREA UNDER X-AXIS ON [1,5] GREATER THAN AREA ABOVE X-AXIS ON [5,8] 1

[2 POINTS] Write each expression below **as a single integral**.

(a) $\int_8^5 f(x)dx + \int_3^8 f(x)dx$

$\int_3^5 f(x)\,dx$ 1

(b) $\int_{-3}^4 f(x)dx - \int_1^4 f(x)dx$

$\int_{-3}^1 f(x)dx$ 1

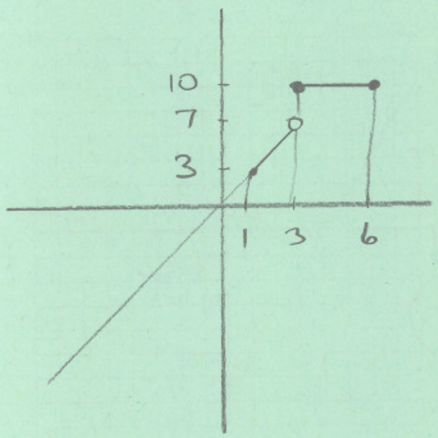
[4 POINTS] Write the definition of "definite integral":

THE DEFINITE INTEGRAL OF f ON $[a,b]$ IS 1
$\int_a^b f(x)\,dx = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i^*)\Delta x$ WHERE $\Delta x = \frac{b-a}{n}$ AND 1 1
$a+(i-1)\Delta x \le x_i^* \le a + i\Delta x$
$\frac{1}{2}$
THE LIMIT MUST EXIST AND BE THE SAME REGARDLESS OF HOW THE x_i^* ARE CHOSEN.
$\frac{1}{2}$

[QUESTIONS ON THE OTHER SIDE]

THIS IS A NO CALCULATOR QUIZ

[4 POINTS] Let $f(x)=\begin{cases} 2x+1 & if\ x<3 \\ 10 & if\ x\geq 3 \end{cases}$. Compute $\int_1^6 f(x)dx$ <u>**using geometry.**</u> <u>**DO NOT USE ANTI-DERIVATIVES**</u>.



$= \frac{1}{2}(3+7)2 + 10(3)$ 2 1

$= 10+30$

$= 40$ 1

[2 POINTS] In each sentence below, circle the underlined word which completes the sentence correctly.

If $f(x)$ is decreasing and concave down on $[a, b]$,

(a) a Riemann sum with midpoint evaluation points will be <u>**MORE**</u> / <u>**LESS**</u> than the area under $f(x)$ on $[a, b]$

(b) a Riemann sum with right-endpoint evaluation points will be <u>**MORE**</u> / <u>**LESS**</u> than the area under $f(x)$ on $[a, b]$

[2 POINTS] **MULTIPLE CHOICE (NO PARTIAL CREDIT)**

Evaluate the Riemann sum of $f(x)=x^2-5x$ on $[2, 10]$ using 4 subintervals, if the evaluation points are the midpoints of each subinterval.

[A]	88	[B]	84	[C]	90
[D]	94	[E]	86	[F]	92

LETTER OF CORRECT ANSWER: A

[2 BONUS POINTS] Sketch the graph of a continuous function $f(x)$ such that the Riemann sum of $f(x)$ on $[a, b]$ using 2 subintervals is less than the area under $f(x)$ on $[a, b]$, regardless of whether the evaluation points are left-endpoints, midpoints or right-endpoints. <u>**HINT: TRY FIRST WITH 1 SUBINTERVAL.**</u>

[QUESTIONS ON THE OTHER SIDE]