Math 1B
Group Quiz 2
Wed Jan 23, 2008

Names: PINK
YELLOW

THIS IS A NO CALCULATOR QUIZ

[5 POINTS] Identify the following as the limit of a Riemann sum and evaluate.

$$\lim_{n\to\infty}\frac{2}{n}\left[\frac{1}{1+2/n}+\frac{1}{1+4/n}+\cdots+\frac{1}{3}\right] = \int_1^3 \frac{1}{x}\,dx \quad (1)$$

$$= \lim_{n\to\infty}\sum_{i=1}^{n}\frac{1}{1+\frac{2i}{n}}\cdot\frac{2}{n} \quad (\tfrac{1}{2}) \qquad = \ln|x|\Big|_1^3 \quad (1)$$

$$= \ln|3| - \ln|1| = \ln 3 \quad (\tfrac{1}{2})$$

$f(a+i\Delta x) = \frac{1}{1+\frac{2i}{n}}$; $\Delta x = \frac{2}{n}$ $(\tfrac{1}{2})$

$f(a+\frac{2i}{n}) = \frac{1}{1+\frac{2i}{n}}$; $a = 1$ $(\tfrac{1}{2})$

$f(1+\frac{2i}{n}) = \frac{1}{1+\frac{2i}{n}}$

$f(x) = \frac{1}{x}$ $(\tfrac{1}{2})$

$\Delta x = \frac{b-a}{n} \Rightarrow \frac{b-1}{n} = \frac{2}{n}$

$b = 3$ $(\tfrac{1}{2})$

$-\frac{1}{2}$ IF NO ABSOLUTE VALUES IN $\ln|x|$

[4 POINTS] Find the average value of the function $f(x) = \dfrac{x^2-3}{x}$ on the interval [1, 4].

$$\frac{1}{4-1}\int_1^4 \frac{x^2-3}{x}\,dx$$

$$= \left(\tfrac{1}{3}\right)\int_1^4 \left(x-\frac{3}{x}\right)dx \quad (\tfrac{1}{2}\ \tfrac{1}{2})$$

$$= \frac{1}{3}\left(\tfrac{1}{2}x^2 - 3\ln|x|\right)\Big|_1^4 \quad (1)$$

$$= \frac{1}{6}x^2 - \ln|x|\Big|_1^4$$

$$= \left(\frac{16}{6} - \ln|4|\right) - \left(\frac{1}{6} - \ln|1|\right)$$

$$= \frac{15}{6} - \ln 4 = \frac{5}{2} - \ln 4 \quad (1)$$

$-\frac{1}{2}$ IF NO ABSOLUTE VALUES IN $\ln|x|$

$-\frac{1}{2}$ IF ANY MISSING PARTS OF INTEGRAL (E.G. NO LIMITS, NO dx)

[1 POINT] Circle the **only** integral below to which the Fundamental Theorem of Calculus applies.

MUST BE CONTINUOUS

$\int_0^5 \ln x\,dx$ $\quad$ $\int_0^{\frac{\pi}{4}} \tan x\,dx$ $\quad$ $\int_0^2 \frac{1}{x^2-4}\,dx$ $\quad$ $\int_{-1}^1 \frac{1}{x^2}\,dx$

(1)