QUIZ # 6 - OR - LAST QUIZ - OR - FINALLY, IT'S OVER! - OR - ... WHAT DID I DO TO DESERVE THIS? ...

MATH 132 WI01

Name (1 point): ....

Problem: Compute the following
(1) the definite integral

$$\int_{\ln 2}^{\ln 3} e^{3x}\,dx$$

(2) the definite integral

$$\int_0^2 \frac{1}{x^2+1}\cdot 2x\,dx$$

(3) the area bounded by: the x-axis, the graph of $y = x$ for x between -1 to 1 (hint: y is negative for $x < 0$ and positive for > 0 ... make sure to **ADD** the areas ...)

Proof. (1)

$$\int e^{3x}\,dx = \frac{e^{3x}}{3}$$

(use the trick I showed you in class, with exponential of, in this case, $3x$ getting integrated to a copy of itself divided by the coefficient of x, that is 3) so

$$\int_{\ln(2)}^{\ln(3)} e^{3x}\,dx = \frac{e^{3x}}{3}\Big|_{\ln(2)}^{\ln(3)} = \frac{1}{3}((e^{\ln(3)})^3 - (e^{\ln(2)})^3) =$$

$$= \frac{1}{3}(3^3 - 2^3) = \frac{19}{3}$$

(2)

$$\int \frac{1}{x^2+1}\cdot 2x\,dx = \ln(x^2+1)$$

(see one of the previous quizzes) and so

$$\int_0^2 \frac{1}{x^2+1}\cdot 2x\,dx = \ln(x^2+1)|_0^2 = \ln(5) - \ln(1) = \ln(5)$$

(3) if you simply integrate from -1 to 1 you get:

$$\int_{-1}^{1} x\,dx = \frac{x^2}{2}\Big|_{-1}^{1} = \frac{1}{2} - \frac{1}{2} = 0!!!$$

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not possible - the area is definitely not zero. Why do we get zero though? the reason is, for $-1 \leq x \leq 0$, x is negative, and hence the area in this interval is negative; we need to break the interval in two parts, and compute the areas separately, and then take the absolute value (drop the negative sign!) off the "negative" area.

$$\int_{-1}^{0} x\,dx = \frac{x^2}{2}\Big|_{-1}^{0} = \frac{0}{2} - \frac{1}{2} = -\frac{1}{2}$$

$$\int_{0}^{1} x\,dx = \frac{x^2}{2}\Big|_{0}^{1} = \frac{1}{2} - \frac{0}{2} = \frac{1}{2}$$

and so Total Area$=\frac{1}{2} + \frac{1}{2} = 1$.

□