Quiz 8

Name: *Super Student*

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Problem 1 (3 points)
The total number of cars N sold by a car company is growing exponentially: $N(t) = N_0 e^{kt}$.
If 2 thousand had been sold by 2009 and 4 thousand had been sold by 2011, how many will have been sold by 2015?

Let $t=0$ correspond to the year 2009.

Then $\begin{cases} N(0) = 2 \\ N(2) = 4 \end{cases} \Rightarrow \begin{cases} N_0 = 2 \\ N_0 e^{2k} = 4 \end{cases} \Rightarrow \begin{cases} N_0 = 2 \\ e^{2k} = 2 \end{cases}$

We need to find $\underbrace{N(6)}_{\text{# cars sold by 2015}} = N_0 \cdot e^{6k} = N_0 \cdot (e^{2k})^3 = 2 \cdot (2)^3 = 16$

Problem 2 (3 points)
Find the integral:

$$\int \ln(e^{-x^2})\, dx = \int (-x^2)\, dx = -\frac{x^3}{3} + C$$

Problem 3 (4 points)
Find the integral:

$$\int \frac{\ln(x^2)}{x}\, dx = \int \frac{2\ln x}{x}\, dx = \begin{bmatrix} u = \ln x \\ du = \frac{dx}{x} \end{bmatrix} = 2\int u\, du =$$

$$= 2 \cdot \frac{u^2}{2} + C = u^2 + C = (\ln x)^2 + C$$