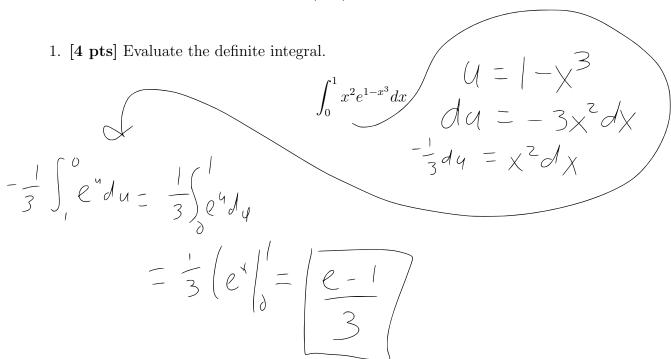
MATH 242 - Quiz 2

01/25/2024



2. [3 pts] The equation below describes the Radioactive decay of a substance. If the half-life of the substance is 1,000 years, determine the value of the constant k.

$$A(t) = A_0 e^{kt}$$

$$\frac{A_o}{2} = A(1,000) = A_o e^{1000k}$$

$$\frac{1}{2} = e^{1000k}$$

$$ln(\frac{1}{2}) = ln(1) - ln(2) = -ln(2) = 1000 K$$

$$K = \frac{ln(2)}{1000} = \frac{ln(\frac{1}{2})}{1000}$$

3. [3 pts] The equation below describes the Radioactive decay of a substance. If the constant $k = -\frac{2}{3}$, find the time required to have only 40 grams remaining after starting initially with 90 grams at t = 0.

$$A(t) = A_0 e^{kt}$$

$$40 = 90e^{-\frac{1}{3}t}$$
 $\frac{4}{9} = e^{-\frac{2}{3}t}$

$$\ln(\frac{4}{9}) = -\frac{2}{3}$$

$$\left(\frac{4}{7} - \frac{3}{2}\ln(\frac{4}{9}) - \frac{3}{2}\ln(\frac{9}{4}) - 3\ln(\frac{3}{2}) - \ln(\frac{27}{8})\right)$$