Quiz 10

Name: _____

1. The length of life before decay of an atom of a certain radioactive substance is a random variable with probability density function

$$p(x) = \begin{cases} \frac{1}{40}e^{-x/40}, & x \geq 0 \\ 0, & x < 0 \end{cases}$$

where x is the number of years of before decay. Find the following:

(a) The probability that an atom lasts at least 60 years before decay.

(b) The expected number of years (which is the same thing as the mean value) that an atom exists. (HINT: Recall the mean value is $\int_{-\infty}^{\infty} xp(x)\,dx$.)

2. Compute the following limits

(a) $\lim_{x\to\infty} e^{-x/20}(200x^{30000} + 7) =$

(b) $\lim_{t\to\infty} \dfrac{3t^2 + 2t - 9}{-7t^2 + 9t + 7} =$

(c) $\lim_{x\to\infty} \dfrac{5e^{3x} - 4e^{x}}{9e^{4x} + 123} =$

(d) $\lim_{z\to\infty} \dfrac{\ln(x^2)}{x^2 + 1} =$