Quiz # 2 — 01/29/14

Answer all questions in a clear and concise manner. Remember that answers without explanation or that are poorly presented may not receive full credit.

1. (5 points) Given $\lim_{x \to 2} f(x) = 5$ and $g(x) = 2f(x) - 5x$. Use limit laws to compute the following limit or explain why we cannot find the limit.

$$\lim_{x \to 2} g(x)$$

Solution:

$$
\begin{aligned}
\lim_{x \to 2} g(x) &= \lim_{x \to 2} [2f(x) - 5x] \\
&= \lim_{x \to 2} 2f(x) + \lim_{x \to 2}(-5x) && \text{Sum Law} \\
&= 2 \lim_{x \to 2} f(x) - 5 \lim_{x \to 2} x && \text{Constant Multiple Law} \\
&= 2 * 5 - 5 * 2 = 0.
\end{aligned}
$$

2. (5 points) According to the National Cancer Institute, radon is the second leading cause of lung cancer. The amount of radon-222 decreases by a half every 3.8235 days. Assuming you have 100 units of radon-222 at time $t = 10$ days, determine a function of the form $f(t) = Ae^{kt}$ for predicting the amount of radon-222 at time t. What are A and k?

Solution:

The amount of radon-222 decreases by a half every 3.8235 days, thus k must be such that $f(3.8235)/f(0) = 1/2 = e^{k*3.8235}$, hence $k = \ln(1/2)/3.8235 = -0.18129$. To determine A, we note that $f(10) = 100 = Ae^{k*10}$, hence $A = 100/e^{k*10} = 612.80$.