Quiz 14

Name: _____

1. The density of nucleotides per nanometer along a strand of DNA is approximated by the density function $\rho(x) = 400 - 3x$, where x is the number of nanometers measured from one end of the DNA. For this problem, include all units of the quantities you calculate.

   (a) How many nucleotides are there in the first hundred nanometers of the DNA strand?

   Integrating from 0 to 100 produces the number of nucleotides:

   $$\int_0^{100} 400 - 3x \, dx = 400x - 1.5x^2 \Big|_0^{100} = 25,000 \text{ nucleotides.}$$

   (b) What is the average density of the nucleotides for the same piece of DNA?

   You can either use the integral formula avg $= \frac{1}{b-a} \int_a^b \rho(x) \, dx$, or you can just divide the previous answer by 100 nanometers. These are actually the same process! So you get 250 nucleotides/nm.