Math 123 Recitation Worksheet 7

1. The growth in length of sculpin is approximated by the von Bertalanffy equation $L(t) = 16(1 - e^{-0.4t})$, where t is in years and L is in cm. An allometric measurement of sculpin shows that their weight can be approximated by the model $W(L) = 0.06L^3$ where W is in grams.
   a. Create a composite function to give the weight of the sculpin as a function of its age, $W(t)$.
   b. Differentiate $W(t)$. What are the units for this expression?
   c. Find the second derivative of $W(t)$ and identify the appropriate units.

2. The price-demand and cost function for the production of x shirts is given by $p = 25 - \dfrac{x}{20}$ and $C(x) = -0.001x^2 + 2x + 200$.
   a. Find the revenue and profit functions, $R(x)$ and $P(x)$.
   b. Find the marginal cost function and marginal profit function.
   c. Find the exact cost of producing the 81st shirt.
   d. Use marginal cost to approximate the cost of producing the 81st shirt.
   e. Find the average cost function, $\overline{C}(x)$, and the marginal average cost function.
   f. Find the average cost and marginal average cost at a production level of 80 shirts, and interpret your answer.