Answer all problems on this page.

1. (4 points) Records indicate that $x$ years after 2005, the average tax on a product is equal to $T(x) = 20x^2 + 40x + 600$ dollars.
   
   (a) (2 points) At what rate was the tax increasing with respect to time in 2005?
   
   (b) (2 points) By how much did the tax change between the years 2005 and 2009?

2. (6 points) An environmental study of an urban environment suggests that $t$ years from now, the average level of carbon dioxide in the air will be $Q(t) = 0.15t^2 + 0.1t + 3.4$ parts per million.
   
   (a) (2 points) At what rate will the carbon dioxide level be changing with respect to time 1 year from now?
   
   (b) (2 points) By how much will the carbon dioxide level change this year?
   
   (c) (2 points) By how much will the carbon dioxide level change over the next 2 years?

3. (5 points) The population density at the centre of a city is 44,000 inhabitants. It then drops to 11,000 at a distance of 9 miles from the centre.
   
   Express population as a function of the form $D(x) = Ae^{kx}$ where $x$ is the distance in miles from the centre. Note: you do not need to compute $k$ precisely.

4. (5 points) A country experiences a GDP decay equal to $G(t) = -3t^2 + 20t + 1800$ billion dollars in 2000.
   
   (a) (2.5 points) What is its GDP decay rate in 2020?
   
   (b) (2.5 points) What is the relative decay rate of GDP in that same year?