

Problem Set 3**Calculus 1****Due 7/6/04**

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1.
 - a) Find an equation for the line tangent to the function $f(t) = 20te^{-0.2t}$ when $t = 0$.
 - b) Find an equation for the line tangent to the function $f(t) = 20te^{-0.2t}$ when $t = 5$.
 - c) Find an equation for the line tangent to the function $f(t) = 20te^{-0.2t}$ when $t = 10$.

2. If $f(x) = x^2 - 2x + 3$, find the exact coordinates of the two points where the tangent lines will pass through the origin.

3. The forecast for the 4th of July is for a high of 86° and a low of 62° . Suppose that the low occurs at 3am and the high occurs at 3pm, with the temperature varying sinusoidally.
 - a) Write a function giving the temperature t hours after midnight.
 - b) What is the temperature at noon?
 - c) What is the average rate of change of the temperature for the hour following noon?
 - d) What is the instantaneous rate of change of the temperature at noon?

4.
 - a) Find the derivative of $\cot \theta$.
 - b) Find the derivative of $\operatorname{arccot} \theta$.