**Calculus I, Mathematics 1210-90**

**Examination 1, September 25,27, 2003**

**You may use graphing calculators. Each problem is worth 20 points. You MUST show your work. Just the correct answer is not sufficient for any points.**

1. Find the derivatives of the following functions:

*a)* $f(x) = 3x^5 + 2x^2 - x + 1$

*b)* $g(x) = (2x-1)^4(x-4)^5$

2. Find the derivatives of the following functions:

*a)* $f(x) = x^3 - x^{-3}$

*b)* $g(x) = \dfrac{\tan x}{\sin x + 1}$

3. Find the equation of the tangent line to the curve $y = x^3 - 3x + \sqrt{x}$ at the point (1,-1).

4. Let $y = x^3 - 48x + 1$. Find the $x$ coordinate of the points at which the graph has a horizontal tangent line.

5. A ball rolls down an inclined plane so that the distance travelled from time 0 to time $t$ seconds is given by $s(t) = 48 - 6t - 12t^2$. What is its velocity at time $t = 3$ seconds?