Name: _____ _____ / **30**

There are 30 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. [15 points] Compute the derivatives of the following functions. Simplify your answers.

a. $f(x) = 2 + \sqrt{x} - e^x$

b. $f(r) = \dfrac{3}{r^3}$

c. $f(x) = \dfrac{\sqrt[3]{x}+5}{x}$. Hint: Don't bother with the quotient rule.

d. $f(x) = x^{-\frac{1}{2}} e^x$

e. $f(x) = \dfrac{x^2+1}{x^2-1}$

2. [5 points] A population of moose is declining. The population at time t is

$$P(t) = \frac{1000}{1+t}$$

where P is the number of moose and where t is measured in years.

Compute the rate of change of the moose population, with units, at time $t = 4$ years.

3. [6 points] A particle is moving along a line, and its position x as a function of time t is

$$x(t) = (1-t^2)e^t.$$

a. Compute the velocity of the particle. Simplify your expression.

b. Compute the acceleration of the particle. Simplify your expression.

4. [4 points] Find the formula for the tangent line to the curve $y = x - x^3$ at $x = 2$.