

I) Find the derivative of each of the following

$$y = 6x^3 + 4x^2 - 2x + 2$$

$$f(x) = [3x^4 + \frac{4}{x} + 2\sqrt{x} - 1].$$

$$f(x) = 2^x + 2 \cdot 3^x$$

$$f(t) = Ae^t + B \ln t \quad . \text{ Assume that } A, B \text{ are constants.}$$

II) Hungary is one of the few countries in the world where the population is decreasing, currently by about 0.2% a year. Thus, if  $t$  is time in years since 1990, the population  $P$ , in millions, of Hungary can be approximated by

$$P = 10.8(0.998)^t.$$

- (a) What does this model predict the population of Hungary will be in the year 2000?
- (b) How fast (in people/year) does this model predict Hungary's population will be decreasing in the year 2000?

III)

- a) If  $g(x) = x^6 + 2$ , find the slope of the tangent line to  $g(x)$  at  $x = -1$ .
- b) Find the equation of the tangent line in part (a).