1. Differentiate each of the following. Pay close attention to your notation.

(a)
$$f(x) = (x^2 + 5x + 7)^3$$

(b)
$$g(x) = \cos(\sqrt{x})$$

(c)
$$y = \sin^2(\theta) + \cos(\theta)$$

(d)
$$z = t^2 - \frac{a}{t^2}$$

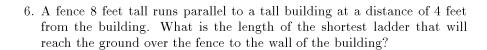
(e)
$$v = \frac{u^3}{u^2 - u}$$

2. Consider $f(x) = x^3 - \frac{1}{x}$ on the interval [0.5, 2]. Find the global max and the global min for f(x) on this interval.

3. Find the intervals on which $f(x) = \frac{x^2}{x-1}$ is increasing.

4. Find a so that $x^3 - ax^2 + bx + 9$ has a relative maximum at x = 1 and a relative minimum at x = 7.

5. Describe how to find the point on the circle $x^2 + y^2 = 1$ that is closest to the point (3,1). Note: you need not actually carry out this operation. I'm looking for a set-up of the problem. How would you find the point farthest from (3,1)?



7. Find a formula for $\cos(2x)$ using differentiation, and the fact that $\sin(2x) = 2\sin(x)\cos(x)$.