Math 220 AL1, Spring 2009, Practice Exam 2

Important: This is merely a study aid. I have not seen the exam and will not be writing the exam. There will be things on the exam which are not on this practice exam.

1. Find the derivatives of the following functions

   (a) $(x^2 + 4x - 2)\tan x$

   (b) $\dfrac{2x - 4}{x^3 + \sqrt{x}}$

   (c) $\sin\left(e^{\cos(5x - 4)}\right)$

   (d) $x^{\pi}\ln(3x^2 + 1)$

2. Find the equation of the tangent line to

$$y = e^{x^2-1}$$

at $x = 1$.

3. Find $f^{(2)}(\frac{1}{2})$ if

$$f(x) = \arctan 2x$$

4. If the height of a rocket at time t is given by

$$s(t) = -t^3 + 6t^2 + 15t + 10,$$

(a) find the velocity and acceleration of the particle at time t.

(b) When does the rocket reach its greatest height?

5. Find the derivative of

$$f(x) = (\cos x)^{\cos x},$$

for $|x| < \pi/2$.

6. Find an equation of the tangent line to

$$x^3y^2 = -3xy$$

at the point $(-1, -3)$.

7. What does the mean value theorem tell you about the location of the zeros of $f'(x)$ if

$$f(x) = (x-3)(x-5)(x-10)(x-15)(x-18)?$$

Explain your answer.