Math 220 AL1, Spring 2009, Practice Exam 4

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. Gravel is being dumped from a conveyor belt at a rate of 30 ft^3/min in such a way that it forms a cone whose base diameter and height are always equal. How fast is the height of the pile increasing when the pile is 10 ft high?

2. What is the average value of the function $f(x) = \dfrac{x}{x+2}$ on the interval $[0, 2]$?

3. Evaluate the following definite integral using Riemann sums.
   (0 points for solving it using the fundamental theorem of Calculus!)

$$\int_{-1}^{1} 3x^2 + x \; dx$$

4. If the velocity of a particle at time t is given by $s(t) = t^3 + t^2 - 2t$, what is the total distance travelled between $t = 0$ and $t = 2$?

5. Find the equation of the tangent line to the curve

$$y = \int_x^5 e^{t^2-25}\, dt,$$

at $x = 5$.

6. Find the following integrals:

(a) $\displaystyle\int_{-1}^{1} x^3(4x^3 + x^8)\ dx$

(b) $\displaystyle\int x^4(\sin x^5)^7 \cos x^5\ dx$

(c) $\displaystyle\int \frac{1}{x(\ln x)^4}\ dx$

(d) $\displaystyle\int_{1}^{2} xe^{2x^2}\ dx$

7. Evaluate the integral

$$\int_0^{\pi/12} \tan 3x \; dx$$

8. Use Simpson's Rule with $n = 4$ to estimate the integral.

$$\int_1^3 4x^2 \; dx$$

How does your estimate compare with the actual value of the integral? Why?