M104, Practice Exam 4

Exam 4 is on Friday, April 19, 2013 in class in our usual classroom. The problems on the exam will be modeled on the ones here. Please work out the problems here in preparation for a class discussion on Wednesday, April 17. For each problem, you must show enough work to justify your answer.

(1) (10 points) Estimate $P(10.1)$ if $P'(10) = 7$ and $P(10) = 90$.

(2) (40 points) Find the following indefinite integrals and definite integrals.

(a) $\int \frac{(\ln(x))^2}{x} dx$ (b) $\int \frac{x^4 + x^6}{x} dx$ (c) $\int \frac{1}{(5x+1)^8} dx$

(d) $\int (e^x + \frac{1}{x^4}) dx$ (e) $\int_1^2 (x^2 + x) dx$

(3) (10 points) Estimate the area under the curve $f(x) = \frac{85}{x^2+1}$ between $x = 1$ and $x = 5$, using midpoint sums with two rectangles.

(4) (10 points) Find the area under $f(x) = x^3$ between $x = 2$ and $x = 4$.

(5) (10 points) Find the area between the x-axis and the graph of $f(x) = x^3$, for x between $x = -2$ and $x = 4$.

(6) (10 points) Write down an integral (but don't bother to evaluate it) for the area bounded by $y = 5x - 6$ and $y = x^2$.

(7) (10 points) Write down an integral (but don't bother to evaluate it) for the consumer's surplus if the demand function is $D(q) = \frac{1000}{2q+86}$, assuming supply and demand are in equilibrium for a demand of $q_0 = 7$.