Math 211 Final Exam

1) Consider the following price demand and price supply equations:

$$D(q) = \sqrt{91 - 2q}, \qquad S(q) = 4 + q.$$

a) Find the equilibrium price and quantity.

b) Find the consumers' and producers' surplus at the equilibrium price level.

2) The Lorentz curves representing the distribution of income for professional football players and basketball players in Turkey in 2004 are given by

$$L_1(x) = \frac{5}{6}x^2 + \frac{1}{6}x, \quad L_2(x) = \frac{3}{5}x^4 + \frac{2}{5}x,$$

respectively. Compute the Gini index for each professional sport and interpret your results.

3) Evaluate the following integrals:

a) $\int(2x - \frac{1}{x} - x^{\frac{2}{3}})dx$

b) $\int \frac{x}{x-2}dx$

c) $\int x^{\frac{3}{4}} lnx \; dx$

d) $\int_0^{\sqrt{5}} \frac{x}{\sqrt{x^2+4}}dx$

4) Find the area of the region bounded by the curves $y = x^2 - 2x$ and $y = -x^2 + 4$.

5) A manufacturer estimates that the marginal cost of producing q units of a certain commodity is $C'(q) = 3q^2 - 24q + 48$. It is also know that the cost of producing 10 units is 5000 dollars.

a) What is the cost of producing 30 units.

b) Use the marginal cost to estimate the cost of producing the 11- th unit.

6) Consider the function $f(x) = 3x^5 - 5x^4$.

a) Find the critical numbers of f and the intervals where f increases or decreases.

b) Find the inflection points of f (if any) and the intervals where f is concave upward or downward.

c) Find the absolute maximum and absolute minimum of f in the interval $[-1, 1]$.