Workout Book Problems:

(Monopoly) 25.1,25.2

(Monopoly Behavior) 26.1,26.2,26.5,26.7,26.8

(Oligopoly) 28.1,28.2

Note: 26.2 and 26.8 use the terms "socially optimal" and "pareto efficient" price. Both of these are where $p = mc$.

1. *Ten* firms each have the cost function $c(q) = q^2$. They are price-takers.

A) Set up each firm's profit function.

B) Solve for each firm's supply (optimal q in terms of p)

C) What is the market supply at price p?

Caution, the solutions to the following problems will not be nice round numbers like you are used to. You will have a square root in your answers, but you can convert this to an approximate decimal number if you want.

D) If demand is given by $Q_d = \frac{500}{p-10}$ what is the equilibrium price when there are 10 firms?

E) How much does each firm produce?

F) What is each firm's profit in equilibrium?

2. Suppose demand is $Q_d = \frac{500}{p-10}$ and a monopolist has cost function $c(q) = q^2$.

A) What is the inverse demand?

B) Set up the firm's profit function.

C) What quantity does the monopolist produce?

D) How much does the monopolist charge?

E) What is its profit?

3. N firms compete in a market in cournot oligopoly. Demand is $Q_d = 110 - p$. Each firm's cost function is $c(q) = 10q$.

A) Set up each firm's profit function in terms of their own output q_i and the total output of the other firms Q_{-i}.

B) What is each firm's optimal q_i as a function of the total quantity produced by the other firms Q_{-i}.

C) What is each firm's quantity in the symmetric cournot equilibrium as a function of N?

D) What is the total quantity supplied and equilibrium price as a function of N?

E) Calculate the total quantity and equilibrium price for $N = 2, 10, 100, 1000$. *(You may need a calculator).*

F) Show that equilibrium price approaches 10 (the marginal cost of each firm) as N increases to infinity.