

HOMEWORK: SEE EXTRA PROBLEMS

1. The corn market data is provided in the table:

U.S. Corn Supply and Demand			
Year	Supply (mil bu)	Demand (mil bu)	Price (\$/bu)
1998	9,800	9,300	1.94
1999	9,400	9,500	1.86

- A. Find the linear supply equation of the form $S = mp + b$, where S is the number of millions of bushels of corn supplied and p is price per bushel.

$$(1.94, 9800) \text{ and } (1.86, 9400) \rightarrow \text{slope} = (9400 - 9800)/(1.86 - 1.94) = 5,000$$

$$S = 5,000p + b$$

$$\text{When } S = 9800, p = 1.94 \rightarrow b = 9800 - 5000(1.94) = 100$$

$$S = 5,000p + 100$$

- B. Find the linear demand equation of the form $D = mp + b$, where D is the number of millions of bushels of corn demanded.

$$(1.94, 9300) \text{ and } (1.82, 9500) \rightarrow \text{slope} = (9300 - 9500)/(1.94 - 1.86) = -2500$$

$$D = -2500p + b$$

$$\text{When } D = 9300, p = 1.94 \rightarrow b = 9300 + 2500(1.94) = 14,150$$

$$D = -2500p + 14,150.$$

- C. Find the equilibrium point.

$$D = -2500p + 14,150 = 5000p + 100 = S$$

$$-7,500p = -14,050 \rightarrow p = 14,050/7500$$

$$p = 1.873\dots$$

$$D = S \sim 9500$$

- D. Graph the supply equation, demand equation, and equilibrium point in the same coordinate system.

Graph using window:

$$X_{\min} = 0$$

$$X_{\max} = 3$$

$$X_{\text{scl}} = 1$$

$$Y_{\min} = 0$$

$$Y_{\max} = 12,000$$

$$Y_{\text{scl}} = 1,000$$

E. For what prices is there a shortage?

A shortage means that supply < demand. Demand = supply when $p = \$1.87$. For prices < \$1.87 the demand increases, but the supply decreases so there will be a shortage for $p < \$1.87$.

F. Find the price when demand is 9000. Is there a surplus or shortage at this price?

$$D = -2500p + 14,150 = 9000 \rightarrow -2500p = -14,150 + 9000 \rightarrow -2500p = -5150$$

$$p = -5150/-2500 = 2.06$$

At this price Demand = $D = 9000$ and supply = $S = 5000(2.06) + 100$

$S = 10,400$. Thus $S > D$, there is a surplus.

Also note, since $p = 2.06 > 1.87$, we also know from part E that there is a surplus.