MA 162 Quiz 1 Thursday 4th September 2014

The quantity demanded of a certain brand of tablet computer is 3000 per week when the unit price is \$485. For each decrease in unit price of \$20 below \$485, the quantity demanded increases by 250 units. The suppliers will not market any tablet device if the unit price is \$300 or below. But at a unit price of \$525, they are willing to make available 2500 units in the market. The supply equation is also known to be linear.

For the following let x denote the quantity of tablet devices and let p denote the unit price of the tablet device.

a) Find the demand equation

The demand curve is linear i.e. the equation for the demand is a straight line. To determine the equation of a line you need either two points or a point and a slope. First we'll identify two points on the demand curve. The first is $(3000, 485)$. Since "each decrease in unit price of \$20 below \$485, the quantity demanded increases by 250 units" our next point is $(3250,465)$. The slope is given by

$$m = \frac{\Delta p}{\Delta x} = \frac{485 - 465}{3000 - 3250} = -\frac{20}{250} = -.08$$

Using the point slope form for the equation of a line

$$p - p_0 = m(x - x_0)$$

$$\boxed{p - 485 = -.08(x - 3000)} \quad \Longrightarrow \quad \boxed{p = -.08x + 725}$$

b) Find the supply equation

We'll follow the same procedure as a). We're explicitly told that " at a unit price of \$525, they are willing to make available 2500 units in the market." This corresponds to the point $(2500,525)$."The suppliers will not market any tablet device if the unit price is \$300 or below" means that a single product wont be made until the unit price is at least \$300. Graphically this corresponds to the point$(0,300)$. The slope is given by

$$m = \frac{\Delta y}{\Delta x} = \frac{525 - 300}{2500 - 0} = \frac{9}{100} = .09$$

Using the point slope form for the equation of a line

$$p - p_0 = m(x - x_0)$$

$$\boxed{p - 300 = \frac{9}{100}(x - 0)} \quad \Longrightarrow \quad \boxed{p = \frac{9}{100}x + 300}$$

c) Find the equilibrium quantity and price

To find the equilibrium quantity, simply set the demand curve equal to the supply curve and solve for x.

$$-.08x + 725 = .09x + 300$$
$$425 = .17x$$
$$\boxed{x_{eq} = 2500}$$

To obtain the equilibrium price, simply evaluate the function at the equilibrium supply

$$\boxed{p_{eq} = p(x_{eq}) = 525}$$