Solution Math 131 Quiz 2 (B)

Q.1: The demand function for a manufacturer's product is $p = f(q) = 600 - 2q$, where p is the price (in dollars) per unit when q units are demanded (per week). Find the level of production that maximizes the manufacturer's total revenue and determine this revenue.

Sol**:** $R = pq = (6-q)\,q = -q^2 + 6q$. The revenue is maximum at $q = -\dfrac{6}{2\,(-1)} = 3$ and maximum revenue is $R\,(3) = -\,(3)^2 + 6\,(3) = \$9$.

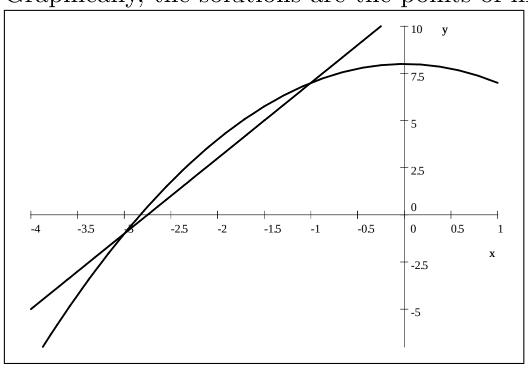
Q.2: The supply and demand equations for a product are $p = q + 20$ and $p = 200 - q$, respectively, where q represents the number of units and p represents the price per unit in dollars. Find the equilibrium price.

Sol**:** $\dfrac{q}{20} - 3 = \dfrac{80}{q}$ gives $q = 80$ and $p = 1$.

Q.3 Solve the system
$$\begin{aligned} y &= 8 - x^2 \\ 4x - y + 11 &= 0 \end{aligned}$$

Sol**:** From second equation $y = 4x + 11$. Put in the first equation, $x^2 + 4x + 3 = 0$ gives $x = -1$ and $x = -3$. For $x = -1,\; y = 7$ and for $x = -3,\; y = -1$. So the solutions are $(-1, 7)$ and $(-3, -1)$.

Graphically, the solutions are the points of intersection of the graphs:



Q.4: A coffee wholesaler blends together three types of coffee that sell for \$2.20, \$2.30, and \$2.60 per pound so as to obtain 100 pounds of coffee worth \$2.40 per pound. If the wholesaler uses the same amount of the two higher-priced coffees, how much of each type must be used in the blend?

Sol**:** Let x = number of pounds of cofee that sells for \$2.20 per pound.
y = number of pounds of cofee that sells for \$2.30 per pound.
z = number of pounds of cofee that sells for \$2.60 per pound.

then $2.20x + 2.30y + 2.60z = 2.40(100)$
$x + y + z = 100$
$y = z$

Solving these equations, we get $x = 20,\; y = 40,\; z = 40$.

Q.5: Sketch the region described by the following system of inequalities:
$$\begin{aligned} x &> -2 \\ y &\geq 2x - 4 \\ 2y + x &< 6 \end{aligned}.$$