Math 100 6 Homework Solutions

Section 1.7

36. (c) \( p = 60 \) supply \( 60 = 5q + 20 \)
\[
q = 8
\]
8 are supplied

Demand
\[
60 = 128 - 4q
Q = 68 - 4q
q = 17
\]
17 are demanded

(b) \( 5q + 20 = 128 - 4q \) \( p = 5 \cdot 12 + 20 = 80 \)
\[
9q = 108
q = 12
\]
So price of 80 leads to supply and demand of 12

39. (a) \[
\frac{24.5x + 93.5}{\text{mint sales}} = \frac{-0.2x + 1007}{\text{gum sales}}
\]
\[24.7x = 913.5 \]
\[x = 36.98\]
So - 2007 year

(b) So year = 1990 + 36.98 = 2026.98
but year must be an integer so year = 2027

(c) Graphs are misleading because they have two different y-scales (max of $300 million on left and $1 billion on right).

43. (a) \( x + y = 2400 \) (total ticket sales = $30 sales + $45 sales)

(b) \( 30x \)

(c) \( 45y \)
(d) \[ 30x + 45y = 84000 \] (amount from $30 sales +
amount from $45 sales = 84000)

(e) \[ x + y = 2400 \]
\[ 30x + 45y = 84000 \]
\[ \times 30 \rightarrow 30x + 45y = 84000 \]
\[ 30x + 30y = 72000 \]
\[ 15y = 12000 \]
\[ y = 800 \]
\[ x = 1600 \]
So need to sell 1600 $30 tickets and 800 $45 tickets

(c) \[ x = \text{aunt. of 30\% concentration} \rightarrow 0.3x \text{aunt. of active ingredient} \]
\[ y = \text{aunt. of 15\% concentration} \rightarrow 0.15y \text{aunt. of active ingredient} \]

\[ x + y = 45 \]
\[ 30x + 15y = 900 \]
(multiply top eqn by 30)

Multiply (bottom eqn)
by 100

\[ x + y = 45 \rightarrow 30x + 30y = 1350 \]
\[ 30x + 15y = 900 \]
\[ 15y = 450 \]
\[ y = 30 \]
\[ x + 30 = 45 \]
\[ x = 15 \]

15 cc of 30\% concentration and 30 cc of 15\% concentration
Demand Eqn: line passing through (10, 900) and (60, 460)

Let \( p = \text{price} \)
\( q = \text{quantity} \)

\[
\frac{900 - 460}{10 - 60} = \frac{440}{-50} = -8.8
\]

\[
(q - 460) = -10(p - 60)
\]
\[q - 460 = -10p + 600\]

\[q + 10p = 200 \rightarrow \text{Demand Equation}\]

Supply Eqn: line passing through (30, 700) and (60, 1400)

Slope \[
\frac{1400 - 700}{50 - 30} = \frac{700}{20} = 35
\]

\[
(q - 700) = 35(p - 30)
\]
\[q - 700 = 35p - 1050\]
\[350 = 35p - q \rightarrow \text{Supply Equation}\]

Solve Simultaneously

\[
10p + q = 200
\]
\[35p - q = 350
\]

\[
45p = 550
\]
\[p = \frac{550}{45} = 12.22...
\]

\[10(12.22...) + q = 200\]
\[q = 77.7...
\]

So market equilibrium is at a price of $12.22, where the wholesaler will supply 78 units and the retailer will accept 78 units, so both are satisfied.
Section 1.8

(39) \[ y \geq 1000 \]
\[ .97x + 124.3829 \geq 1000 \]
\[ .97x \geq 871.6171 \]
\[ x \geq \frac{871.6171}{.97} \]
\[ x \geq 898.57 \text{ (or } 899) \]

(40) \[ 9.3451x + 649.3385 \leq 1000 \]
\[ 9.3451x \leq 350.6615 \]
\[ x \leq 37.52 \text{...} \]
\[ x < 35.52 \text{ means } years \leq 1985.52 \text{...} \]
\[ Since \ years \ must \ be \ integers \ years \leq 1985 \]

(41) Life \ mean life = 1500
\[ 10\% = 150 \]
\[ 10\% \ less = 1500 - 150 = 1350 \]
\[ 10\% \ more = 1500 + 150 = 1650 \]
\[ 1350 \leq \text{life} \leq 1650 \]

(42) Solve each inequality
\[ 4 \leq 554x - 2.886 \leq 6 \]
\[ 4 \leq 554x \leq 6.886 \]
\[ .554x \leq 6.886 \]
\[ 6.886 \leq .554x \]
\[ 12.4286 \leq x \]
\[ x \leq 16.0397 \]
\[ 12.43 \leq x \leq 16.04 \]
Let \( x \) = \# of logic boards

\[
\begin{align*}
\text{Cost} & = 125x + 345,000 \\
\text{Revenue} & = 489x \\
\text{Profit} &= \text{Revenue} - \text{Cost} \\
489x & > 125x + 345,000 \\
364x & > 345,000 \\
x & > 947.8
\end{align*}
\]

(or interpreted discretely \( x \geq 948 \)).