Answer Key for homework 1

Review of Graphs and Formulas

1. a. question 2 on page 30
The data lie along a straight line and (if economics enrollments are recorded along the vertical axis) the slope is 0.25, as shown in the figure below. This means that for every 100 additional students in the university, enrollment in economics courses rises by 25 students.

![Graph](image)

b. question 3 on page 30
The slope of the tangent to the curve at point M is approximately 0.

c. question 6 on page 30
Point A shows that 30 hours of labor and 40 hours of machine time will produce 20 units of the output Z. Point B shows that 20 units of Z can also be produced by using somewhat more labor (about 42 hours) and somewhat less machine time (about 26 hours). At points A and B, the same output is produced. The different positions of A and B show that the same output can be produced using different combinations of inputs.

2. a. \( P = 10 - 2Q \)
b. \( P = 100 - 4Q \)

\[ \text{slope} = -4 \]

\[ \begin{array}{c}
Q \\
0 \quad 25
\end{array} \]

\[ \begin{array}{c}
P \\
0 \quad 100
\end{array} \]

c. \( P = 50 + 6Q \)

\[ \text{slope} = 6 \]

\[ \begin{array}{c}
P \\
0 \quad 50
\end{array} \]

\[ \begin{array}{c}
Q \\
0
\end{array} \]

d. \( I = 10000 - 500r \Rightarrow r = 20 - \frac{I}{500} \)

\[ \text{slope} = -\frac{1}{500} \]

\[ \begin{array}{c}
I \\
0 \quad 10000
\end{array} \]

\[ \begin{array}{c}
r \\
0 \quad 10
\end{array} \]

2.

a. The area under line between \( Q = 0 \) to 5 is,
S = 1/2 * 10 * 5 = 25

b. The area under line between Q = 0 to 5 is,
S = 1/2 * (100 + 80) * 5 = 450

4.

a. P = 10 - 2Q, P = 4 + Q
5.  
   a. Find out where the two lines intersect. Solve  
      \[ P = 10 - 2Q \] and  
      \[ P = 4 + Q \]  
      We get \( Q = 2 \) and \( P = 6 \). The area is  
      \[ S = \frac{1}{2} \times 6 \times 2 = 6 \]  
   b. Solve \[ P = 100 - 4Q \] and  
      \[ P = 50 + 6Q \]  
      We get \( Q = 5 \), \( P = 80 \). Again,  
      \[ S = \frac{1}{2} \times (100 - 50) \times 5 = 125 \]  

Positive versus Normative

(a) P  (b) N  (c) N  (d) P  (e) P  (f) N  (g) P  (h) N  (i) N  (j) P

Efficiency

7. (a) If the train is not full, then the cost of taking another passenger is very low (almost zero). But the price that some potential passengers are willing to pay might be less than $20 and greater than the marginal cost. This leaves the trade opportunity open.

   (b) The demands for food are different during the peak time and normal time. If Cafe Bernardo could charge lower prices during the normal time than during the normal time, it would attract more customers and make both the owner of the Cafe and the customers better off.

   (c) Since the parking lots are mostly empty at night, the marginal cost is really low. But the charge of one dollar is too high and will discourage many people from parking in the parking lots at night. The gap between the price and the marginal cost leaves the trade opportunity open.
(d) Since the demands for different courses are different, there is a trade opportunity where people will be satisfied if they pay more to get in some popular classes (like Economics) and pay less to get in some not-so-popular classes.

(e) Assume the marginal cost per seat of Opera production is $200, there is the gap between the price of $50 and the marginal cost of $200.

(f) Requirement of high safety standards in poor countries will discourage these countries from producing and exporting goods to US. This obviously leaves the trade opportunity open.

8. (a) In term of efficiency criteria, a free market will encourage more people to sign up for donating their body parts until the price of body parts balances the market.

(b) If we let the market operate, we'll find these bad things always end up where the poor live because at this point marginal cost equals price and there is no trade opportunity which can make both sides better off.

9. (a) Since Richmond has the smallest population, it would suffer the least aggregate "annoyance".

(b) From the second row of the table, Staines is our answer.

(c) The most efficient choice is over Staines.

(d) Since the decline in house prices reflects the true economic cost of the "annoyance", the efficient choice should be the city that has the least dollar value of damage.

(e) Without knowing other cities' bids, Richmond will bid at most $1200m, Southall will bid at most 600m, Staines will bid at most $300m and Harrow will bid at most $900m. Suppose Richmond, Southall and Harrow realize that Staines will bid at $300m, they will bid $301m. Thus each of these three will not be on the flight path and will be better off than if they were on the flight path. If at least $300m of the collected money is given to Staines, then Staines will be at least as well off as before.

(f) No. As we can see from the second and the third row of the table, the additional opportunity cost of extending flight to 24 hours is at least $200m, i.e. at least $50m greater than the marginal benefits.