Chapter 3: Marginal Analysis for Optimal Decisions
Quiz

When answering the questions below, please show all details of your calculations.

1. A decision maker is choosing the levels of two activities, A and B, so as to maximize total benefits under a given budget. The prices and marginal benefits of the last units of A and B are denoted P_A, P_B, MB_A, and MB_B.

   a. If $P_A = \$20$, $P_B = \$40$, $MB_A = 300$, and $MB_B = 400$, what should the decision maker do? Why?

   $\frac{MB_A}{P_A} = \frac{300}{20} = 15$ $\frac{MB_B}{P_B} \frac{400}{40} = 10$. Choose more of activity A and B because it has higher Marginal benefit per dollar.

   1.0

   b. If the substitution in part (a) continues to equilibrium (the optimal outcome) and MB_A falls to 250, what will MB_B be?

   A $\frac{250}{20} = 12.5$ B = $\$40 \times 12.5 = 500$

   MB_B should be $\frac{500}{40}$.

   $\frac{MB_A}{P_A} = \frac{MB_B}{P_B}$ this is where it is optimal since the last unit will give the marginal benefits per $ to be equal.

   1.0

2. Appalachian Coal Mining believes that it can increase labor productivity and, therefore, net revenue my reducing air pollution in its mines. It estimates that the marginal cost function for reducing pollution by installing additional capital equipment is MC = 40P where P represents a reduction of one unit of pollution in the mines. It also feels that for every unit of pollution reduction the marginal increase in revenue (MR) is MR = 1,000 – 10P. How much pollution reduction should the mining company undertake?

   $MC = 40P$

   $MR = 1{,}000 - 10P$

   $MR = MC$

   $1{,}000 - 10P = 40P$

   $1{,}000 = 50P$

   $P = 20$ unit reduction of pollution

   1.0

3.0