Solutions to Review Questions based on Chapter 11 and 13

5.

a. With perfect competition in the product market, the firm can sell any quantity of the commodity at the given market price for the commodity. That is, the firm faces an infinitely elastic demand curve for the commodity at the given market price of the commodity. With perfect in the output market, the firm can purchase any quantity of the factor at the given market price of the factor.

b. A profit-maximizing firm will employ a factor of production only as it adds more to its total revenue than it adds to marginal cost, i.e., as long as MRP > MFC (monopolist in the output market, monopsonist in the factor market), MRP > w (monopolist in the output market, perfect competitor in the factor market) or VMP > w (perfect competition in both input and output markets).

c. The firm produces where the law of diminishing returns is operating (and marginal product declines). This causes the VMP (or MRP) to decline. It is from the declining portion of the MRP (or VMP) schedule for the factor that we get the firm's demand schedule for the factor.

6. a. Value of goods that can be bought: G = wH.
     Hours of work per day: H = 24 - L or L = 24 - H.

b. The utility that must be maximized is
$$\text{Max } U(G, L).$$

Substituting the values of G and L, we get

$$\text{Max } U(wH, 24 - H).$$

Marginal benefit of work $= \dfrac{\partial U(.)}{\partial H} = U_G w;$

Marginal cost of leisure foregone $= \dfrac{\partial U(.)}{\partial L} = U_L;$

In equilibrium, the marginal benefit of work must be equal to the marginal cost of leisure foregone, i.e.,

$$U_G w = U_L$$
$$\Rightarrow w = \frac{U_L}{U_G}$$

$\Rightarrow$ The real wage rate is equal to the marginal rate of substitution between goods and leisure.

c. Given: $U(G, L) = G + 2L^{1/2}$.

$U_L = L^{-1/2};$
$U_G = 1;$

We know that $w = \dfrac{U_L}{U_G}$.

$\Rightarrow$ $w = (24 - H)^{-1/2}. \Rightarrow H = 24 - w^{-2} \Rightarrow H = 24 - \dfrac{1}{w^2}$. This is the labor supply function.

7. Equation for MRP: $y = mQ_a + c$, where m is the slope of the MRP curve. Slope = -10.

$\Rightarrow$ $60 = -10(4) + c \Rightarrow c = 100 \Rightarrow MRP = 100 - 10Q_a.$
$\Rightarrow$ $MFC = 10 + 10Q_a$.

⇨ Equating MRP and MFC,

⇨ $100 - 10Q_a = 10 + 10Q_a$.

⇨ $Q_a = 4.5$

⇨ $P_a = 32.5$

⇨ Monopsonist exploitation = MRP - P_a = $100 - 10(4.5) - 32.5 = 23.5$