Question 1

(a) Since the wage is independent of the manager's effort, it is optimal for the manager to choose $e = 0$. Thus,

manager's effort is $e = 0$, and the firm's profit $\pi^a = 40$

(b) Now the manager solves:

$$\max_{e \geq 0} 0.1(80e - 0.1e^2) - e.$$

Taking the derivative with respect to e yields $0.1(80 - 0.2e) - 1 = 0$. Thus, $80 - 0.2e = 10$. Thus,

manager's effort is $e = 350$, the firm's profit $\pi^a = 12,250$

the manager's total compensation is 1,225

Question 2

(a) The disutility of $e = 1$ is 10. Thus, in order to induce the worker to choose the high effort level, w_h (the wage if he chooses $e = 1$) must be at least **$w_h = 20$.**

(b) The worker's expected utility from choosing **$e = 1$** is 20

The worker's expected utility from choosing **$e = 0$** is **$5p + 30(1 - p)$**

(c) If $e = 1$ then utility is $w - 10$. If $e = 0$ utility is $5p + w(1 - p) = 1 + 0.8w$. Thus, $1 + 0.8w = w - 10$. Thus, **$w = 55$.**

(d) Explain briefly how the results are affected if firing workers is difficult: A worker's payoff from shirking increases. Thus, in order to induce $e = 1$ the firm would have to raise the wage or increase p. It may also be impossible to deter shirking.

(e) Suppose again that workers can be fired. Explain briefly how the results are affected if the firm pays just the "market wage" and it is easy to find new jobs. Workers will shirk, since the penalty of being fired is low.

Question 3

Quantity of variable input	total output	marginal product of variable input	average product of variable input
0	0	—	—
1	60	60	60
2	100	40	50
3	120	20	40
4	132	12	33

Question 4

(a) To produce Q units of output the firm uses $K = L = Q$. Thus, costs per unit are originally 5. Then they increase to 7.

The cost of producing Q units of output increases by 40%.

(b) Originally, the cost of producing a unit of output is 2. After the price increase costs remain the same.

The cost of producing Q units of output increases by 0 %.

Question 5

(a) If the firm decreases skilled labor by 1 unit, then it would have to increase unskilled labor by 4 units in order to keep output the same. Thus, MRTS = 4. The marginal product of unskilled labor is 40. Thus,

The marginal product of skilled labor is 160 .

(b) Now the MRTS is 3.5. Thus, $w_S/w_U = 3.5$. The wage of a skilled worker is 70,000. Then

The wage of an unskilled worker is 20,000.

(c) The wage of skilled workers is 50,000, that of unskilled workers is 20,000. Thus, the MP of a skilled worker is 2.5 times of an unskilled worker. The marginal product of an unskilled worker is 10. Thus,

The marginal product of a skilled worker is 25 .

Question 6

(a) $P = \text{MC} = 10 + 4Q$. Thus, $Q = P/4 - 2.5$. Thus,

Aggregate supply is $Q_S(P) = 25P - 250$.

In equilibrium, $2,000 - 20P = 25P - 250$, i.e., $45P = 2,250$.

The equilibrium price is $P = 50$.

(b) With the tax, costs are $C(Q) = 19Q + 2Q^2$. Thus, $P = \text{MC} = 19 + 4Q$. Thus, $Q = P/4 - 19/4$. Industry supply is $Q_S(P) = 25P - 475$. Thus, $2,000 - 20P = 25P - 475$, i.e., $45P = 2,475$.

The equilibrium price is $P = 55$.

At this price, demand is 900. Thus,

The government's tax revenue is 8,100 .

Question 7

(a) Suppose the firm uses the optimal (i.e., profit maximizing) two-part pricing schedule, consisting of a fixed fee F and a price per unit, P. Then

The firm sets $P = \text{MC}$. Thus, $P = 2$. Therefore, $Q = 6$. Thus, the net-surplus is 9.

$F = 9$, $P = 2$.

The firm's profit (per consumer) is 9.

(b) The government introduces a tax of 2 Dollars on the firms per unit of output that is produced, i.e., the new cost function is $C(Q) = 4Q$. Now, $\text{MC} = 4$. Thus, $P = 4$ and therefore $Q = 2$. Thus,

$F = 1$, $P = 4$.

The firm's profit (per consumer) is 1.

The tax revenue (per consumer) is 4.

The profit loss is 8. The loss to the consumers is 0. Thus, the deadweight loss is 4.

For each Dollar of taxes raised, the deadweight loss is 100 cents.

Question 8

Firm	P	MR	Rev.	Q	TC	MC	ATC	AVC	Recommendation
A	3.9	3.0	**7,800**	2,000	7,400	2.9	**3.7**	3.24	**increase**
B	5.9		**59,000**	10,000	**47,400**	5.9	4.74	4.24	**decrease**
C	**11**	9	44,000	4,000	**47,600**	9	11.9	10.74	**shut down**
D	35.9	37.9	**179,500**	5,000	**179,500**	37.9	35.9		**No change**
E	35		3,990	1,000	3,300		at min	23.94	**problem**

Question 9 Recall that

$$MC = P\left(1 + \frac{1}{\epsilon_P^D}\right).$$

Thus, in country A, $12 = P_A(1 - 2/3) = P_A/3$, which implies $P_A = 36$. In country B, $12 = P_B(1 - 1/2) = P_A/2$.

$P_A = 36$, $P_B = 24$.

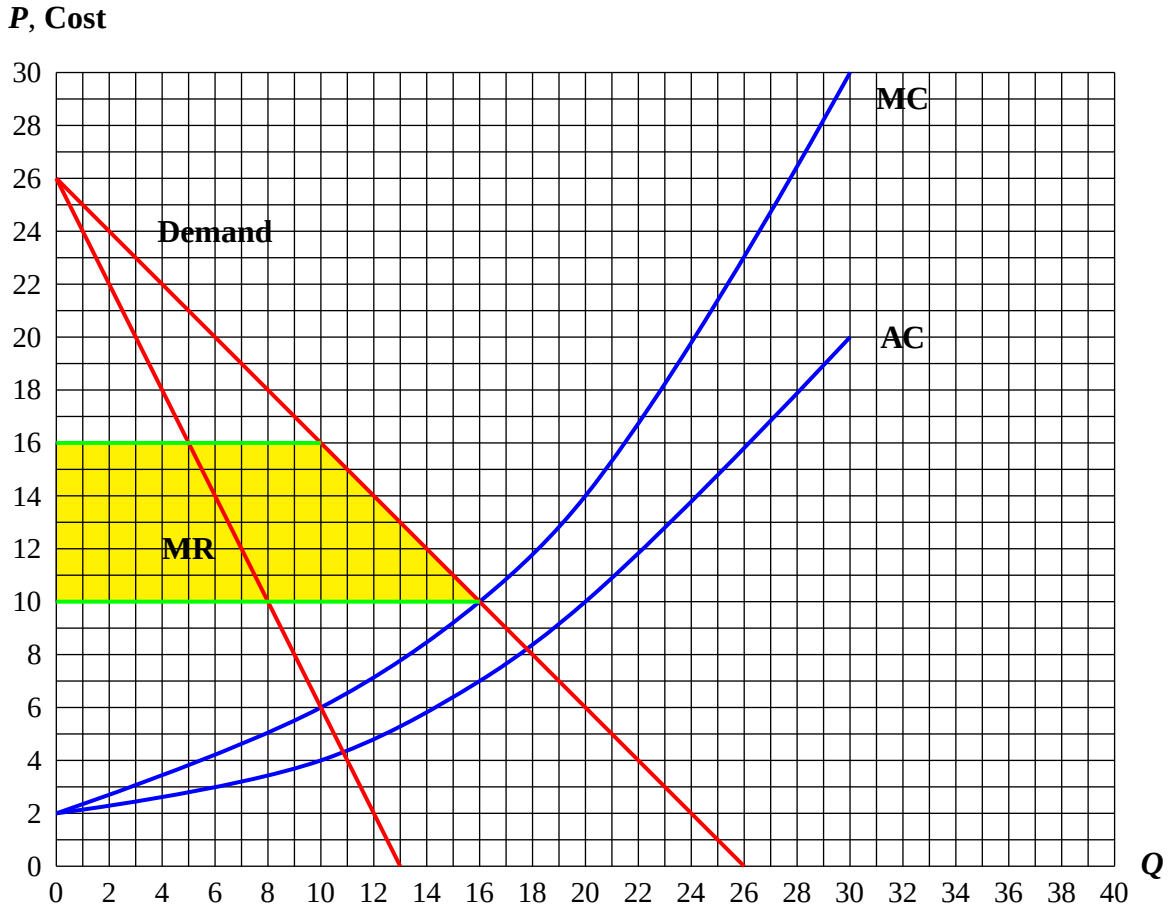
Suppose the government of country A decides to buy the product in country B for the citizens of country A in order to make the product available at lower prices (in case $P_B < P_A$). What will be the likely reaction of the firm?

The firm will charge the same price in both countries. This price will be either between P_B and P_A or it will be equal to P_A and the firm does no longer serve the market in country B.

Does the government of country B have an incentive to disallow such purchases?

Yes, because it will raise the price for citizens in country B.

Question 10



If p = MC, the supply is given by the MC curve. Thus, $Q = 16$ and $P = 10$. At $Q = 16$ average costs is 7. Thus, the profit per unit is 3, and total profit is 48.

$P = 10, Q = 16$. Firm profits are 48.

If the firm is a monopolist then MR = MC. Thus, $Q = 10$. Therefore, $P = 16$. At $Q = 10$ average costs are 4 and the profit per unit is therefore 12. Thus,

$P = 16$, $Q = 10$. Firm profits are 120.

The net-loss to the consumers (i.e., change in consumer surplus) is given by the yellow area, i.e, **78 .** The change in profits is 72. The efficiency loss: **–6.**