Homework Exercises 7: Monopoly

1a. Using the figures given, we can compute marginal revenue and marginal cost.

Q	*P*	*TR*	*MR*	*TC*	*MC*
100,000	100	10,000,000		2,000,000	
200,000	80	16,000,000	60	3,000,000	10
300,000	60	18,000,000	20	5,000,000	20
400,000	40	16,000,000	-20	9,000,000	40
500,000	20	10,000,000	-60	15,500,000	65

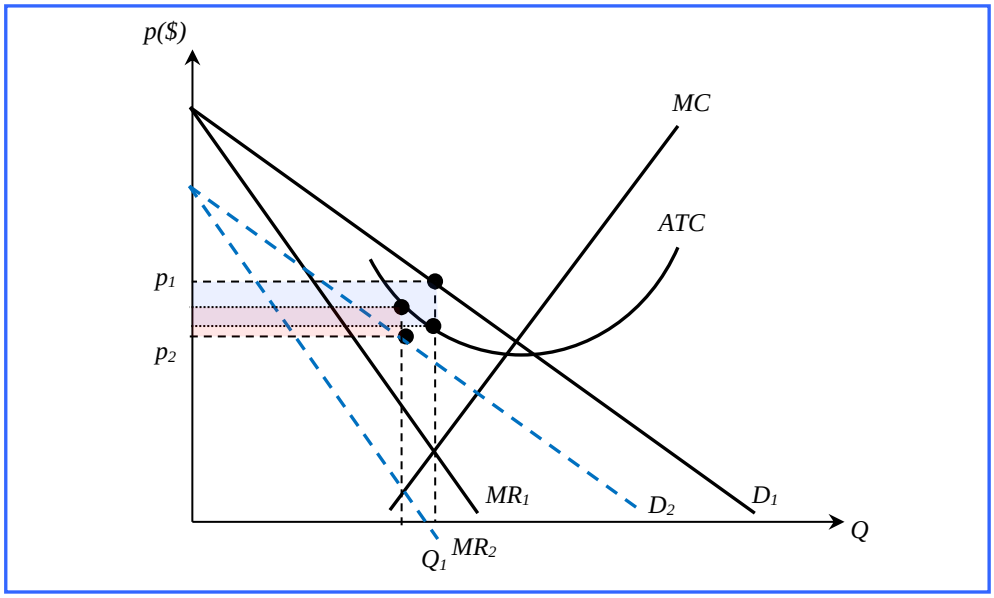
Warmfuzzy should produce 300,000 copies at \$60 per book. At this output, marginal revenue (\$20) equals marginal cost (\$20).

1b. Warmfuzzy's maximum profit = \$18,000,000 – \$5,000,000 = \$13,000,000.

1c. Adding a \$1,000,000 fixed bonus increases total cost at all output levels, but does not affect marginal cost or marginal revenue. Warmfuzzy should still print 300,000 copies at \$60 per book. The new profit is \$18,000,000 – (\$5,000,000 + \$1,000,000) = \$12,000,000.

TC	*MC*
3,000,000	
4,000,000	10
6,000,000	20
10,000,000	40
16,500,000	65

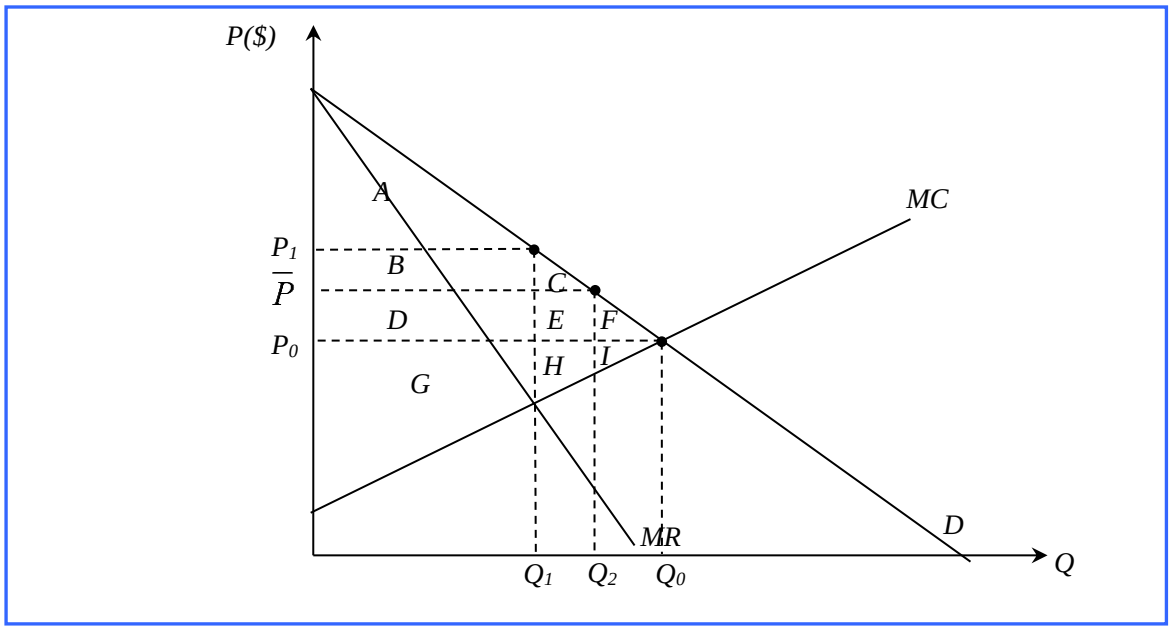
2.



Initially, Bleyer Industries Inc. charges price p_1, while selling Q_1 plastic Easter eggs. Since p_1 is above Bleyer's average total cost *ATC* at the level of Q_1, Bleyer is profitable. The competition from cheaper imports reduces the demand for Bleyer's eggs from D_1 to D_2. If the drop in demand is large enough, Bleyer will only able to sell Q_2 plastic at p_2, incurring an economic loss as p_2 is below *AC* and Bleyer will exit the market.

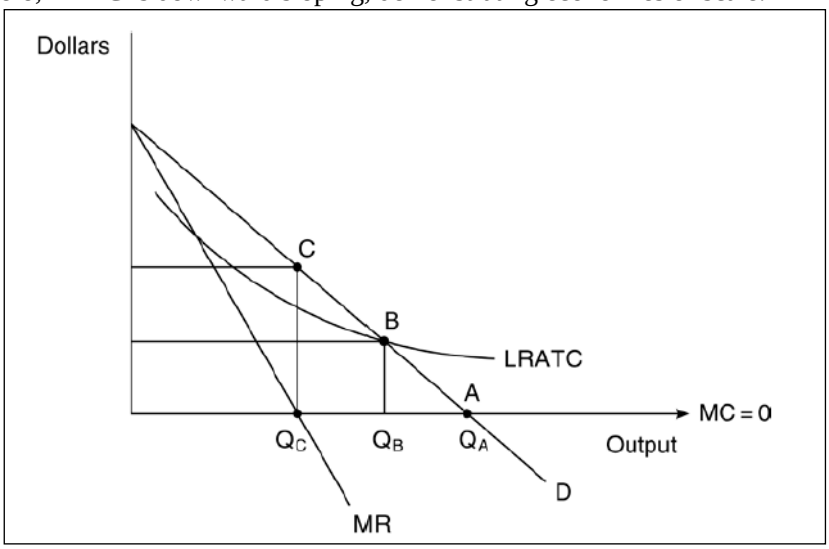
3. When the government sets a price ceiling $\bar{p}$, below the monopoly price (but above marginal cost), the monopoly is forced to increase output compared to monopoly level, lowering price. So, the deadweight loss is reduced. Consumer surplus rises; producer surplus falls. The market outcome moves closer to efficiency, but is not fully optimal unless the price ceiling equals marginal cost ("efficient price").

   The welfare effects are illustrated:



Surpluses	Socially Optimal	Monopoly	Change	With Price Control	Change
CS	*A + B + C + D + E + F*	*A*	*-(B + C + D + E + F)*	*A + B + C*	*- (D + E + F)*
PS	*G + H + I*	*B + D + G*	*B + D – H – I*	*D + E + G + H*	*D + E – I*
Welfare	*A + B + C + D + E + F + G + H + I*	*A + B + D + G*	*- (C+ E + F + H + I) Deadweight Loss*	*A + B + C + D + E + G + H*	*- (F + I) Deadweight Loss*

4. The following diagram shows the market for a particular music sold online. As, the marginal cost is zero, LRAC is downward sloping, demonstrating economies of scale.

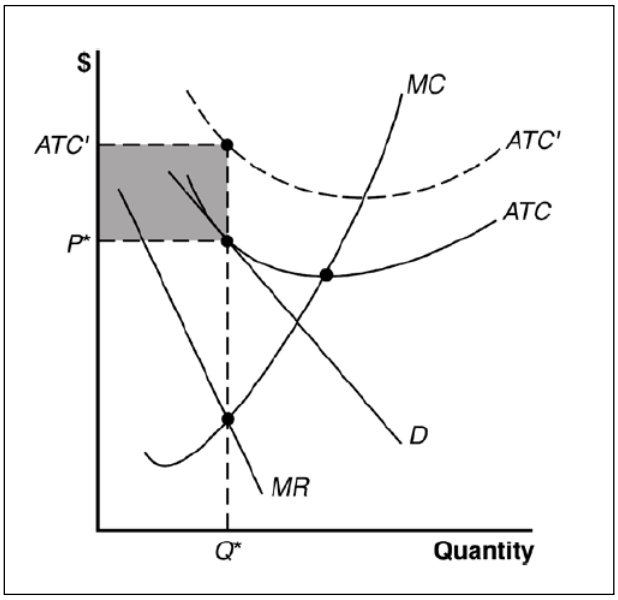


The unregulated level of production is Q_C.

The efficient level of production is Q_A.

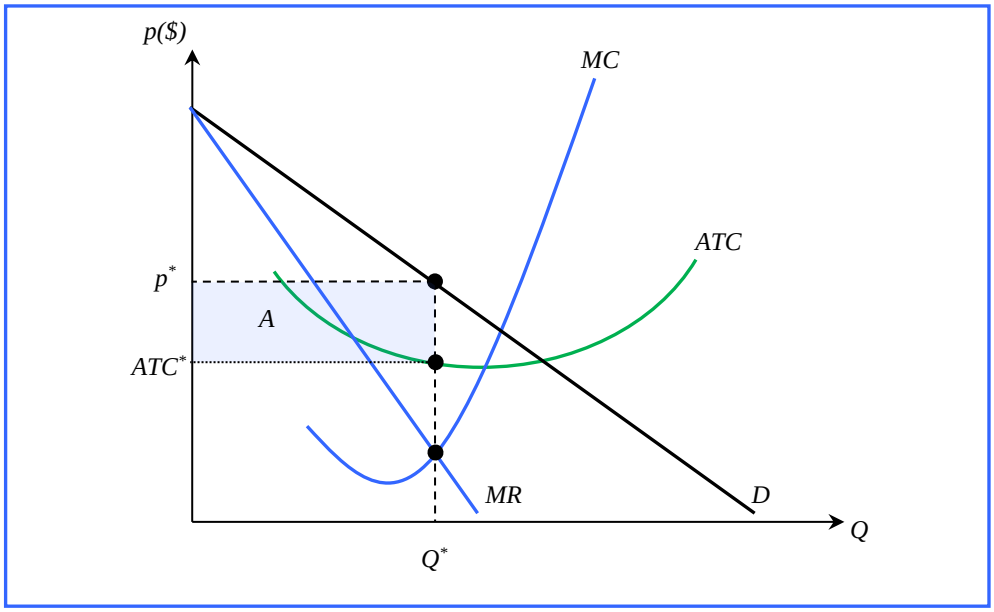
The "fair rate of return" level of production is Q_B.

5.

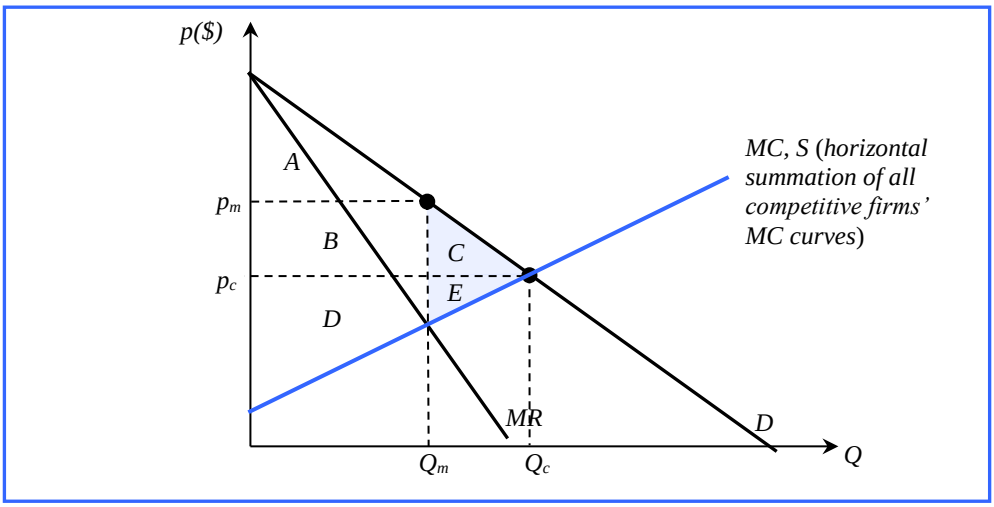


The monopoly is making zero economic profit if it produces Q^*, sold at P^* and the average total cost is represented by ATC , i.e. $ATC=P^*$. If the price of using a fixed input rises, the monopolist's average total cost curve will shift upward to ATC'. But marginal cost, which is the *change* in *variable* cost as quantity varies, will be unaffected. Because marginal cost and marginal revenue are unaffected, the short-run profit-maximizing price and quantity will be unchanged. However, the firm will suffer economic loss because ATC'>P*.

6a. When the drug prices are not regulated, the pharmaceutical firm would produce at Q^*, at which $MC = MR$, and set its price at P^*, earning an positive economic profit (area A).



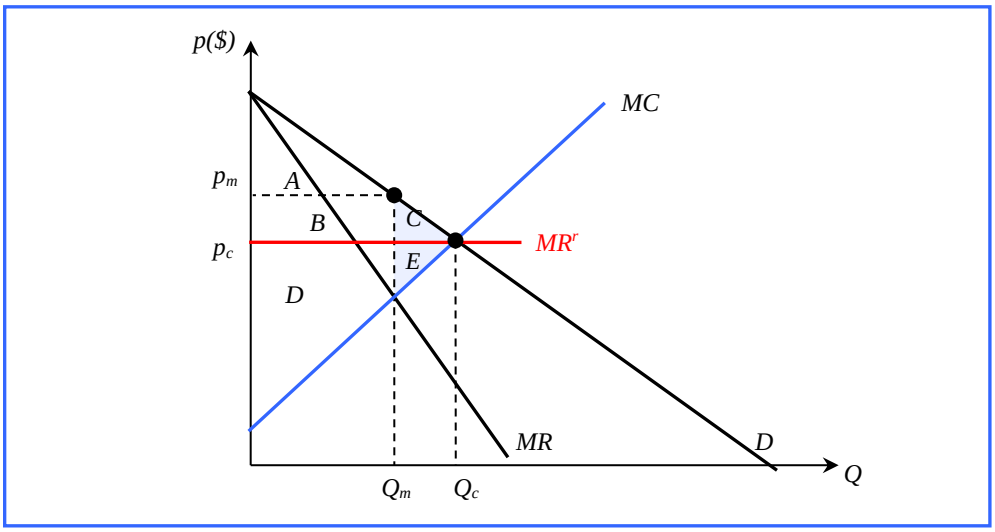
6b.



To evaluate the efficiency of a monopoly market, assume the monopoly as arising from the "capture" of a competitive industry and the monopoly doesn't change the way the output is produce. So, the MC curve of the monopoly is equivalent to the market supply curve in the original perfectly competitive market. The following table summarizes the welfare changes:

	Competition	Monopoly	Change
CS	$A + B + C$	A	$-(B + C)$
PS	$D + E$	$B + D$	$B - E$
CS + PS	$A + B + C + D + E$	$A + B + D$	$DWL = -C - E$

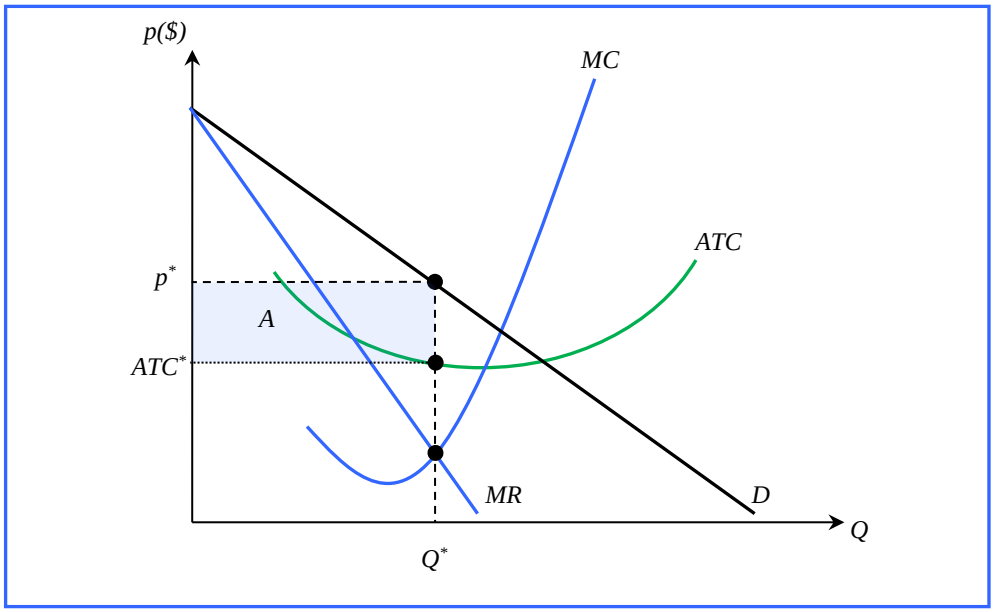
6c.



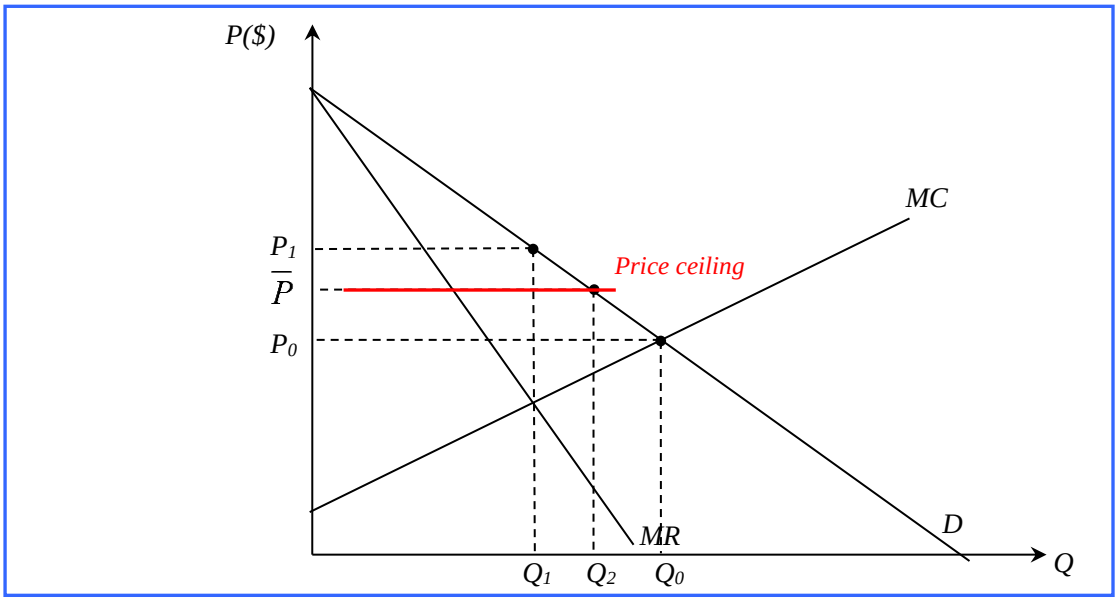
To induce the monopoly to produce the efficient output level, the government (or Medicare) should set the "negotiated price", effectively a price ceiling, at p_c, at which the *MC* curve interacts the demand curve. With the price ceiling, the marginal revenue curve, $MR^r = p_c$. To maximize profit, the monopoly output will be induced to increase output from Q_m to Q_c, at which $MR^r = MC$. Therefore, the market is efficient and the deadweight loss is eliminated.

6d. Setting the price ceiling at this level would make drug development and innovation unprofitable. It will discourage pharmaceutical firms from drug development and innovation.

7a. When the drug prices are not regulated, the hospital would produce at Q^*, at which $MC = MR$, and set its price at P^*, earning an positive economic profit (area A).



7b.



When the government sets a price ceiling $\bar{p}$, below the monopoly price (but above marginal cost), the monopoly is forced to increase output compared to monopoly level, lowering price. So, the deadweight loss is reduced. Consumer surplus rises; producer surplus falls. The market outcome moves closer to efficiency, but is not fully optimal unless the price ceiling equals marginal cost ("efficient price").

7c. Hospitals rely on revenue from drug sales; when markup is fixed, they compensate by prescribing more expensive drugs (to get higher absolute profit/fixed markup, i.e. 15% of a more expensive drugs means higher absolute profit) or unnecessary medicines (to increase sales volume). This maximizes income within constraints but leads to inefficient outcomes (overtreatment, high overall spending).

8a. Apple aims to use price discrimination to increases its profits. Apple charges college students and faculty less ($999 vs $1,099 for MacBook Air M2) because students are more price-sensitive ("elastic" demand). This is price discrimination: serving different willingness to pay increases Apple's profits

8b. Apple did not practice price discrimination in this case, because Apple sold a different, lower-spec model for schools only at $999. The lower price reflected reduced quality; it was not the same product as sold to the public. This is product differentiation, not price discrimination (which is charging different prices for the same good).

9a. With $MC = \$5$, Patty will determine her profit-maximizing output rate by setting $MC = MR$.

At $Q = 4$, $MR(\$6) > MC(\$5)$, but at $Q = 5$, $MR(\$4) > MC(\$5)$. So, admit 4 swimmers at $9 each. $profit = TR - (TFC + TVC) = \$9 \times 4 - (\$24 + \$5 \times 4) = \$36 - \$44 = -\$8$ (loss).

Since $TR > TVC(\$20)$, she should keep on admitting 4 swimmers and lose -$8 in the short run, but will exit in the long run.

9b. The demand curve provides information about potential swimmers' willingness to pay for admission. Using this information, Patty will charge $9 to 4 swimmers (Group 1) and $5 to next 4 (Group 2 – the next 4 swimmers are willing to pay $5). In this case, she would admit 8 swimmers.

$profit = TR - (TFC + TVC) = (\$9 \times 4) + (\$5 \times 4) - (\$24 + \$5 \times 8) = \$56 - \$64 = -\$8$ (loss).

Since $TR > TVC(\$40)$, she should keep on admitting 8 swimmers and lose -$8 in the short run, but will exit in the long run.

9c. Patty will charge $10 to 3 swimmers (Group 1), $9 to 1 swimmer (Group 2) and $5 to next 4 (Group 3). In this case, she would admit 8 swimmers.

$profit = TR - (TFC + TVC) = (\$10 \times 3) + (\$9 \times 1) + (\$5 \times 4) - (\$24 + \$5 \times 8) = \$59 - \$64 = -\$5$ (loss).

Since $TR > TVC(\$40)$, she should keep on admitting 8 swimmers and lose -$5 in the short run, but will exit in the long run.

9d. Patty will admit ALL swimmers up to where MC = willingness to pay (Q = 8 swimmers) and charge their maximum willingness to pay.

$profit = TR - (TFC + TVC) = (\$10 + 9 + 8 + \cdots + \$5) - (\$24 + \$5 \times 8) = \$68 - \$64 = \$4$ (profit).

She would stay in the industry in the long run.