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Lösungen zu den In-Chapter Exercises «Mikroökonomik I»

Quelle:

- **Thinking Like an Economist**
  Frank, Robert H, & Cartwright, Edward. (2016). *Microeconomics and Behaviour (2nd European ed.)*. London: McGraw-Hill Education

Lösungen Chapter 1

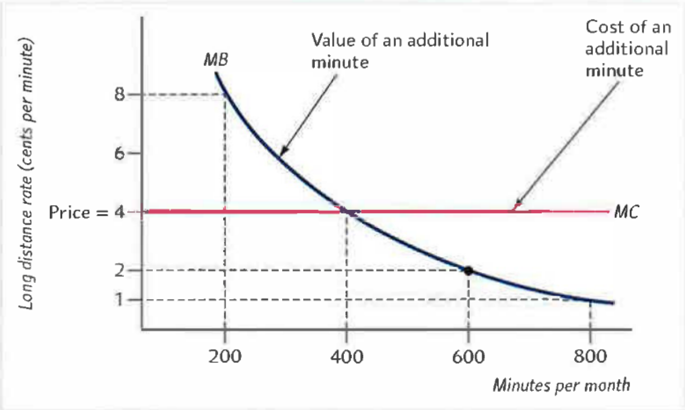
1.1 Someone who gets a €28 traffic ticket every 200 kilometres driven will pay €35 in fines, on average, for every 250 kilometres driven. Adding that figure to the €20 hassle cost of driving, and then adding the €50 fuel, oil and maintenance cost, we have €105. This is more than the €100 bus fare, which means taking the bus is best.

1.2 The €18 Mike paid for his ticket is a sunk cost at the moment he must decide whether to attend the concert. For both Jim and Mike, therefore, the costs and benefits should be the same. If the benefit of seeing the concert outweighs the cost of sitting in the rain, they should go. Otherwise, they should stay home.

1.3 You should use your coupon for the New Delhi trip, because it is more valuable to save €120 than to save €100.

1.4 Two boats. Referring to Table 1.2, note that if marginal cost is €150, it now pays to launch the second boat (marginal benefit = €180) but not the third.

1.5 At 2 cents per minute, Susan should talk for 600 minutes per month.

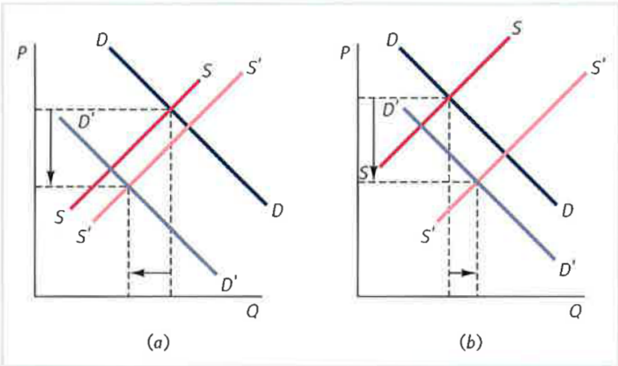


Lösungen Chapter 2

2.1 At a price of 4 cents/tulip, the quantity demanded is 5,000 tulips/day and the quantity supplied is 1,000 tulips/day, making excess demand equal to 4,000 tulips/day. At a price of 20 cents/tulip, excess supply is 4,000 tulips/day.

2.2 A rent control level set above the equilibrium price has no effect. The rent will settle at its equilibrium value of €600/mo.

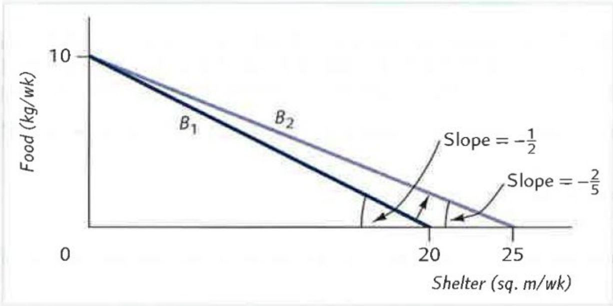
2.3 The fall in the price of diesel fuel shifts the supply curve to the right. The report on mercury shifts the demand curve to the left. As shown in the following diagrams, the equilibrium price will go down (both panels) but the equilibrium quantity may go either up (panel *b*) or down (panel *a*).



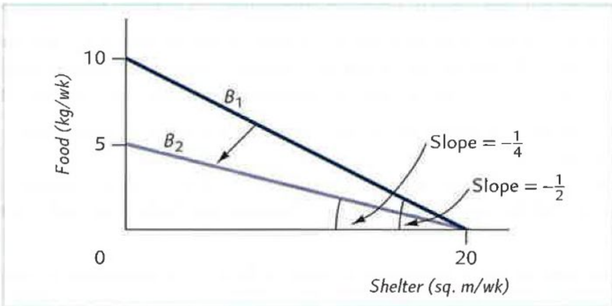
2.4 $P^*/4 = 6 - P^*/2$, which yields $Q^* = 2$ and $P^* = 8$.

Lösungen Chapter 4

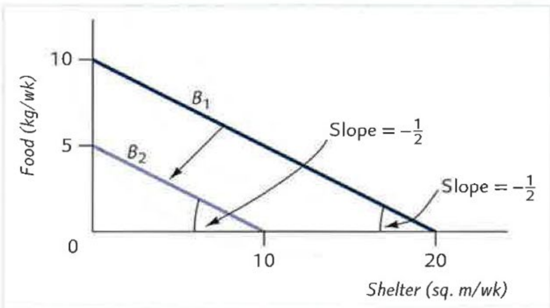
4.1 *Food (kg/wk)*



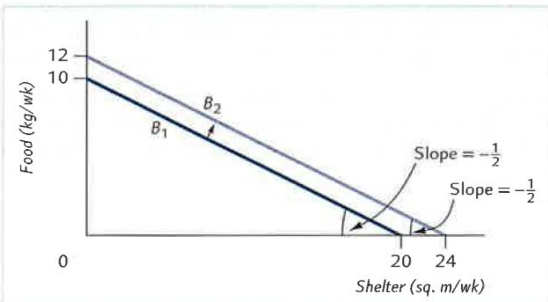
4.2 *Food (kg/wk)*



4.3 *Food (kg/wk)*



4.4 *Food (kg/wk)*



4.5 The budget constraint for a residential consumer with Gigawatt Power Company would be kinked outward, as the initial rate for the first 1,000 kWh/mo is lower. For power consumption X up to 1,000 kWh/mo, the budget constraint has a slope of the lower rate €0.05/kWh.

$$Y = 400 - 0.05X \qquad 0 \leq X \leq 1{,}000 \text{ kWh/mo}$$

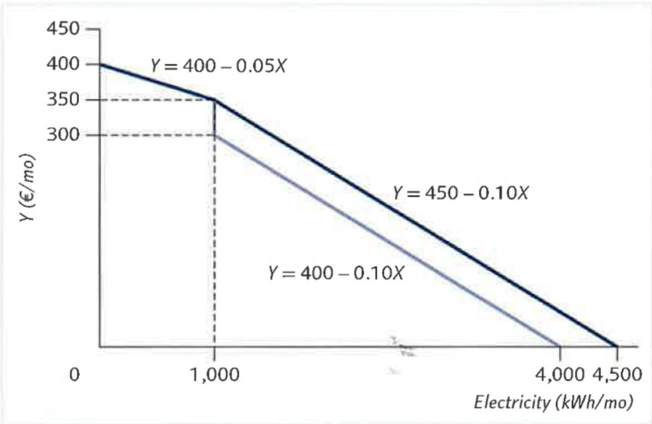
For power consumption X above 1,000 kWh/mo, the budget constraint has a slope of the higher rate €0.10/kWh.

$$Y = 450 - 0.10X \qquad X > 1{,}000 \text{ kWh/mo}$$

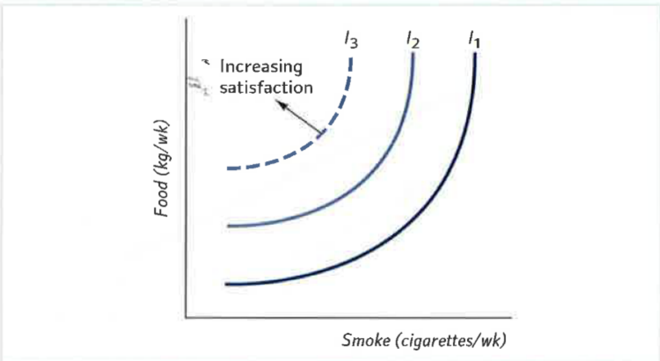
The kink occurs when $X = 1{,}000$ kWh/mo, where the level of consumption of other goods is $Y = 400 - 0.05X = 400 - 50 = 350$, or equivalently, $Y = 450 - 0.10X = 450 - 100 = 350$. If the rate were instead €0.10/kWh for all kWh that exceeded 1,000 kWh/mo, then the budget constraint for $X > 1{,}000$ kWh/mo would be

$$Y = 400 - 0.10X \qquad X > 1{,}000 \text{ kWh/mo}$$

and would have a discrete jump from $Y = 350$ to $Y = 300$ at $X = 1{,}000$ kWh/mo.



4.6

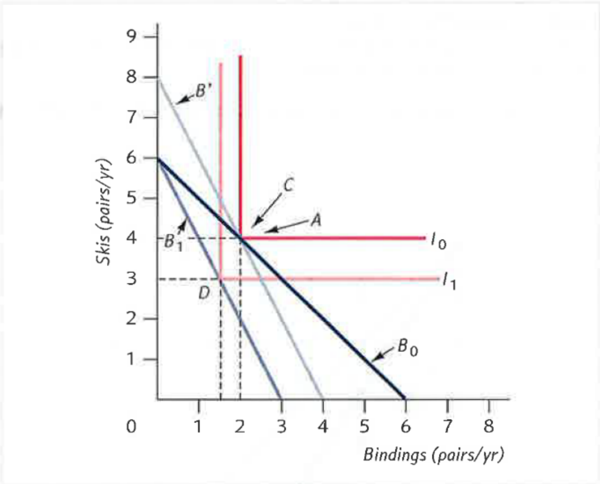


4.7 At bundle A, the consumer is willing to give up 1 kg of food to get an additional square metre of shelter. But at the market prices it is necessary to give up only $\frac{1}{2}$ kg of food to buy an additional square metre of shelter. It follows that the consumer will be better off than at bundle A if he buys 1 kg less of food and 2 sq. m more of shelter.

4.8 Albert's budget constraint is $T = 120 - 2B$. Albert's new preferences are for one pat of butter for every slice of toast $B = T$. Substituting this equation into his budget constraint yields $T = 120 - 2T$, or $3T = 120$, which solves for $T = 40$ slices of toast, and thus $B = 40$ pats of butter each month. Not only has Albert cut the fat, but he is consuming more fibre too!

Lösungen Chapter 5

5.1 On Paula's original budget, B_0, she consumes at bundle A. On the new budget, B_1, she consumes at bundle D. (To say that D has 1.5 pairs of bindings per year means that she consumes 3 pairs of bindings every 2 years.) The substitution effect of the price increase (the movement from A to C) is zero.



5.2 At a price of €1.09 Pam can afford only 11 cups of coffee per week. But, she would not switch to tea. So, the total effect of the price rise is 1 cup/wk. With an income of €13.08 Pam could attain her initial utility and would buy 12 cups of coffee. So, the substitution effect is 0.

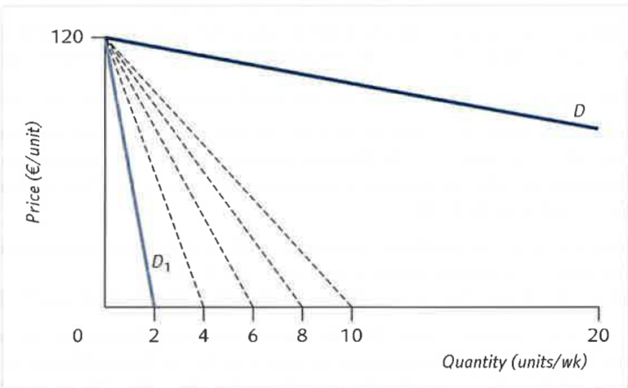
5.3 The formulas for D_1 and D_2 are $P = 16 - 2Q_1$ and $P = 8 - 2Q_2$, respectively. For the region in which $0 \le P \le 8$, we have $Q_1 = 8 - (P/2)$ and $Q_2 = 4 - (P/2)$. Adding, we get $Q_1 + Q_2 = Q = 12 - P$, for $0 \le P \le 8$. For $8 < P \le 16$, the market demand curve is the same as D_1, namely, $P = 16 - 2Q$.

5.4 First, we need to rearrange the representative consumer demand curve $P = 120 - 60Q_i$ to have quantity alone on one side:

$$Q_i = 2 - \frac{1}{60}P$$

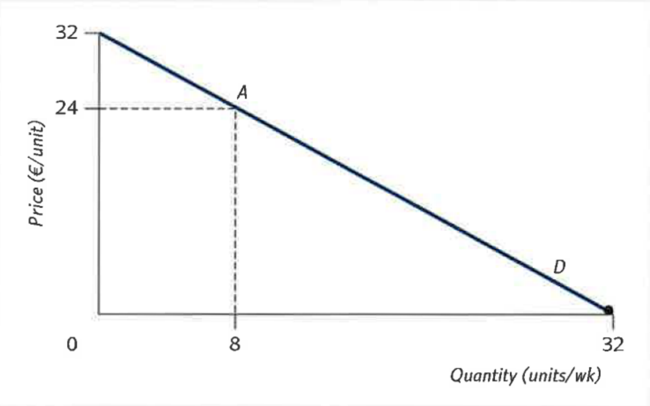
Then we multiply by the number of consumers, $n = 30$,

$$Q = nQ_i = 30Q_i = 30\left(2 - \frac{1}{60}P\right) = 60 - \frac{1}{2}P$$



Finally, we rearrange the market demand curve $Q = 60 - \frac{1}{2}P$ to have price alone on one side, $P = 120 - 2Q$, to return to the slope-intercept form.

5.5 Since the slope of the demand curve is -1, we have $\varepsilon = -P/Q$. At $P = 24$, $Q = 8$, and so $\varepsilon = -P/Q = -\frac{24}{8} = -3$.



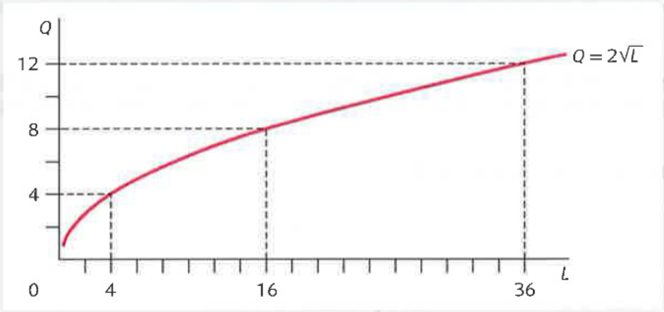
5.6 Elasticity when $P =$ €4/sq. m is $\frac{1}{3}$, so a price reduction will reduce total expenditure. At $P = 4$, total expenditure is €48/wk, which is more than the €39/wk of total expenditure at $P = 3$.

Lösungen Chapter 6

6.1 Demand will fall by 3 per cent to around 1,136 million journeys. The price will increase by around 17 pence. So, the increase in revenue is around £134 million.

Lösungen Chapter 10

10.1. For $K = 4$, $Q = \sqrt{4}\sqrt{L} = 2\sqrt{L}$



10.2. The slope of the total product curve in Figure 10.2(*a*) is 2 for all values of L. So $\mathrm{MP}_{L=3} = 2$.

10.3. The slope of the ray to any point on the total product curve is 2, and so $\mathrm{AP}_{L=3} = 2$. When the total product curve is a ray, as here, $\mathrm{AP}_L = \mathrm{MP}_L$ is constant for all values of L.

10.5. From the relationship $\mathrm{MP}_L/\mathrm{MP}_K = \mathrm{MRTS}$, we have $3/\mathrm{MP}_K = 9$, which yields $\mathrm{MP}_K = 1/3$.

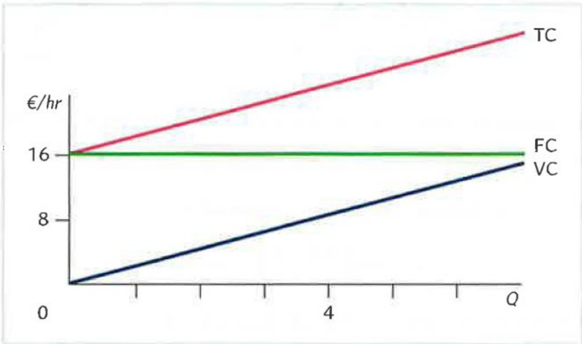
A.10.1. Farmer Giles should only use method 1. The marginal product with this method is more than that with method 2 up to the desired quantity.

A.10.2. $F(K, L) = \sqrt{K}\,\sqrt{L}$, so $F(cK, cL) = \sqrt{cK}\,\sqrt{cL} = \sqrt{c^2}\,\sqrt{K}\,\sqrt{L} = cF(K, L)$, and so it has constant returns to scale.

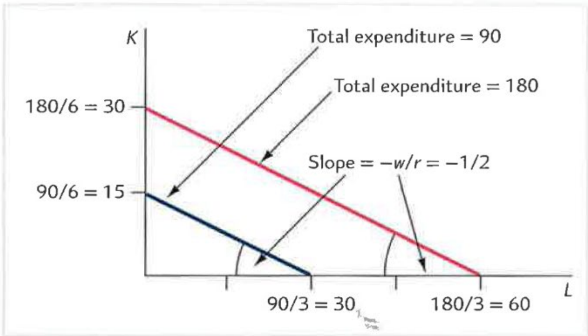
A.10.3. $F(K, L) = K^{1/3}\,L^{1/3}$, so $F(cK, cL) = (cK)^{1/3}(cL)^{1/3} = c^{2/3}K^{1/3}\,L^{1/3} = c^{2/3}\,F(K, L) < cF(K, L)$, and so it has decreasing returns to scale.

Lösungen Chapter 11

11.1. The variable cost curve is the same as before; the FC and TC curves are shifted upward by 8 units. (See the following graph.)



11.5.



11.6. To produce 20 units of output, we will need $L = K = 20$. As $r = 10$ and $w = 5$, costs are

$$C = 10K + 5L = 200 + 100 = 300$$

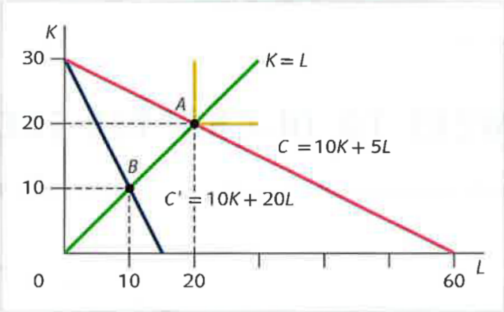
which may be rewritten as $K = 30 - \frac{1}{2}L$ in slope-intercept form. When the wage rises $w = 20$, keeping costs at $C = 300$ requires that we find the point at which $K = L$ on the new isocost curve

$$C = 10K + 20L = 300$$

which may be rewritten as $K = 30 - 2L$ in slope-intercept form. Setting $K = L$, we have

$$10K + 20L = 300 = 10L + 20L = 300 = 30L = 300, \text{ so } L = 10$$

Thus, $L = K = 10$ and we produce $Q = 10$.



11.7. To produce 20 units of output, we will need $L = 20$ or $K = 20$. Since $r = 10$ and $w = 5$, costs are

$$C = \min\{10K, 5L\} = \min\{200, 100\} = 100$$

When the wage rises to $w = 20$, keeping costs at $C = 100$ implies that

$$Q = \max\left\{\frac{100}{r}, \frac{100}{w}\right\} = \max\{10, 5\} = 10$$

Thus, we use no labour ($L = 0$), all capital ($K = 10$) and produce $Q = 10$.

A.11.2 Substituting $K = 4$ into the production function gives $Q = 2L^{0.5}$. Rearranging gives $L = Q^2/4$. Short-run total costs are $STC_Q = 36 + Q^2/4$. Differentiating with respect to Q gives $SMC_Q = Q/2$.

A.11.3 Note that both labour and capital have marginal product of 1 and yet labour is cheaper. The least-cost way of producing Q units of output is, thus, to employ $L = Q$ units of labour. This means that long-run total costs are $TC_Q = 2Q$. Long-run marginal costs are $LMC_Q = 2$.

Lösungen Chapter 12

12.1. Let r^* be the monthly interest rate for which Cullen's economic profit would be zero. Then r^* must satisfy £16,000 − £4,000 − £800 − r^* (£100,000,000) = 0, which yields $r^* = 0.000112$, or 0.0112%/mo. Cullen should relocate only if the interest rate is lower than r^*.

12.2. Marginal cost is the slope of the total cost curve, and marginal revenue is the slope of the total revenue curve. At the maximum profit point, $Q = 7.4$, the slopes of these two curves are exactly the same.

12.3. First, we need to rearrange the representative firm supply curve $P = 20 + 90Q_i$ to have quantity alone on one side.

$$Q_i = -\frac{2}{9} + \frac{1}{90}P$$

Then we multiply by the number of firms $n = 30$.

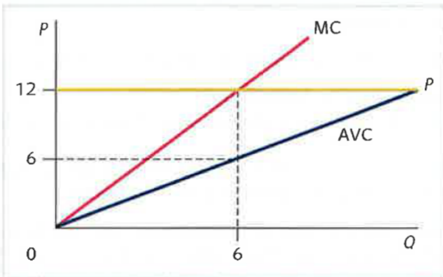
$$Q = nQ_i = 30Q_i = 30\left(-\frac{2}{9} + \frac{1}{90}P\right) = -\frac{20}{3} + \frac{1}{3}P$$

Finally, we rearrange the industry supply curve in order to get $P = 20 + 3Q$.

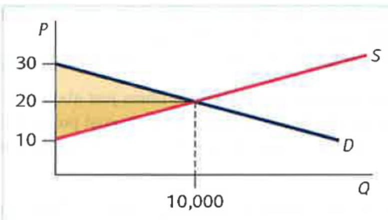
12.4. Short-run profit maximization for a perfectly competitive firm occurs at the quantity where price equals marginal cost, $P =$ MC, provided $P >$ min AVC (otherwise, the firm shuts down). Since marginal cost is MC = $2Q$, the market price $P = 12$ equals marginal cost $12 = 2Q$ at quantity $Q = 6$. Note that min AVC = 0 here. We can express profits (with fixed costs separated out) as p = $(P - \text{AVC})Q - \text{FC}$. Since average variable cost is $AVC = Q = 6$, the firm would earn profits of

$$\pi = (12 - 6)6 - \text{FC} = 36 - \text{FC}$$

Thus, with fixed cost FC = 36, the firm would earn zero profits.



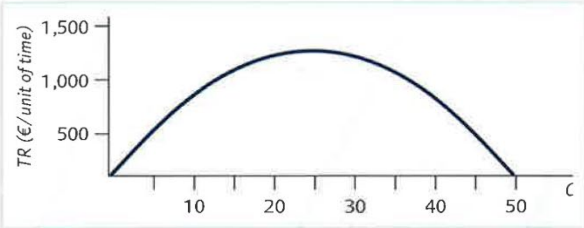
12.5. Total surplus is equal to the sum of the two shaded triangles shown below, which is €100,000/yr.



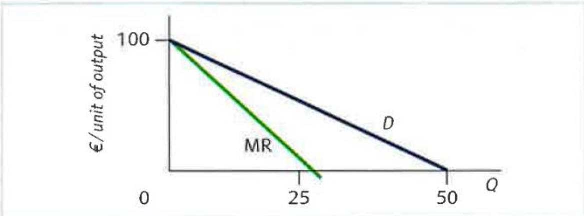
$$CS = \frac{1}{2}(30 - 20)\ 10{,}000 = 50{,}00$$
$$PS = \frac{1}{2}(20 - 10)\ 10{,}000 = 50{,}00$$

Lösungen Chapter 13

13.1.

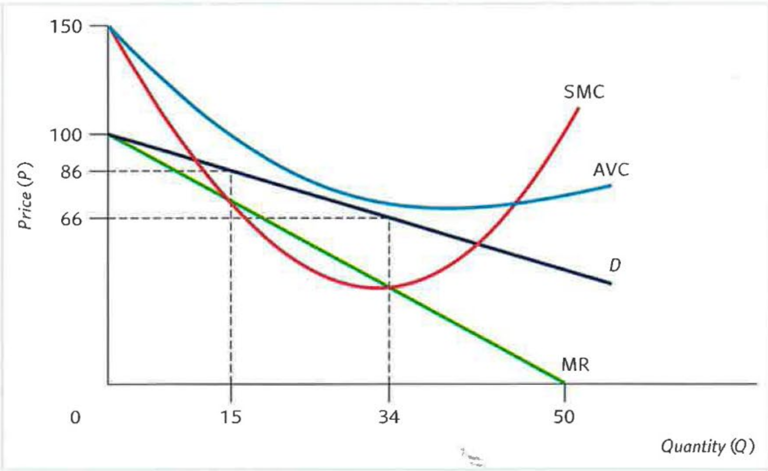


13.2.

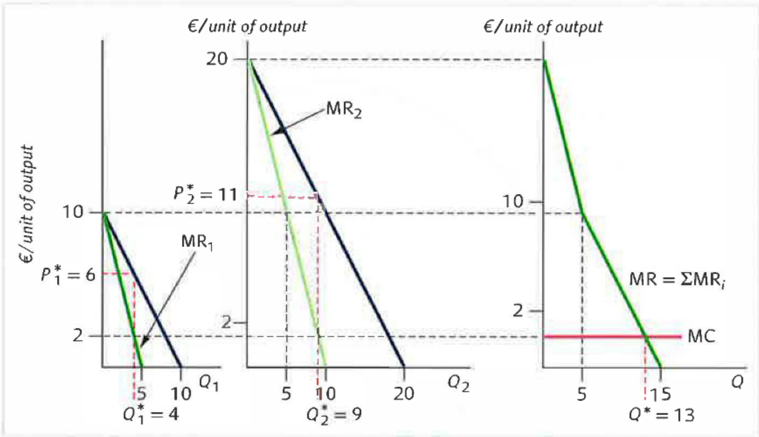


13.3. $MC = 40 = 100 - 4Q$, which solves for $Q^* = 15$, $P^* = 100 - 2Q^* = 70$.

13.4. The profit-maximizing level of output for a single-price monopolist occurs where MR = MC. Marginal revenue equals marginal cost at both $Q = 15$ and $Q = 34$, but $Q = 34$ has marginal revenue intersect from above and thus is the maximal one. However, even at $Q = 34$, price does not cover average variable cost ($66 = P < AVC = 72$). The average variable cost curve lies everywhere above the demand curve (see figure), so the firm can do no better than earn profits equal to negative of the fixed costs. Thus, the optimal quantity is $Q = 0$: the firm should shut down!

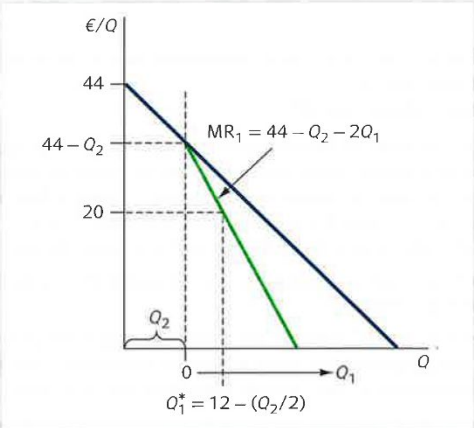


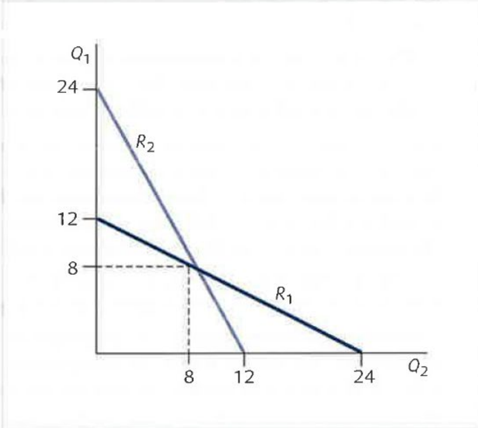
13.5. $MR_1 = 10 - 2Q_1$ (left panel) and $MR_2 = 20 - 2Q_2$ (centre panel), so the horizontal summation of the MR curves is given by ΣMR (right panel). The profit-maximizing quantity is 13, 4 of which should be sold in market 1, the remaining 9 in market 2. The profit-maximizing prices are $P_1^* = 6$ and $P_2^* = 11$.



Lösungen Chapter 14

14.4.





14.5. Price will settle at marginal cost, and so $P = 2$. The corresponding market demand, $Q = 8$, will be shared equally by the two firms: $Q_1 = Q_2 = 4$.

Lösungen Chapter 18

18.1 The monopolist will produce where marginal revenue equals marginal cost. The marginal revenue curve is $MR = 100 - Q/10$. Setting $MR = MC$ we have $100 - Q/10 = Q/20$. This yields the profit-maximizing quantity $Q^* = 667$MWhr. Plugging $Q^* = 667$ back into the demand curve we get the profit-maximizing price, $P^* = €67$. We know, see Example 18.4, that the efficient level of output is $Q = 800$.

18.2 By living together each party saves €90/mo in rent. If we ignore the possibility of negotiation, they will not live together because this saving is less than the cost to Jones of having to live with a smoker. But suppose they are able to negotiate costlessly. The practical question then becomes whether the *total* savings in rent justifies the cost of the compromise to Jones. The total savings in rent is €180/mo and since this saving exceeds the cost to Jones by €30/mo, it should be possible to negotiate an agreement whereby the two will prefer to live together. Smith will have to give some of his €90/mo savings to Jones. Let X denote the amount Smith gives to Jones. Since the cost to Jones of living with a smoker is €150/mo, and his savings in rent is only €90/mo, X must be at least €60/mo. Because Smith gets to continue smoking in the shared living arrangement, his €90/mo rent savings is pure gain, which means that €90/mo is the largest possible value for X. The relevant details for this example are summarized in the table below.

TABLE 18.8
Payoff Summary for Example 18.8

	Net rental payment (€/mo)		Net gain (€/mo)		
	Jones	Smith	Jones	Smith	Total
Live separately	300	300	–	–	–
Live together; Smith pays Jones X to compensate for smoke, $60 \le X \le 90$	$210 - X$	$210 + X$	$X - 60$	$90 - X$	**30**

The cost to Smith of not smoking is €250/mo. The cost to Jones of living with a smoker is €150/mo. The total savings in rent from living together is €600/mo – €420/mo = €180/mo, which is €30/mo more than the least costly compromise required by shared living quarters, which is the €150/mo it costs Jones to live with a smoker.

18.3. With a negotiation cost of only 20, it is now practical for the confectioner to pay the doctor to rearrange his office when the confectioner is liable. But note in the table below that it is still more efficient for the confectioner not to be liable:

		Net benefit		
Legal regime	**Outcome**	**Doctor**	**Confectioner**	**Total**
Liable	Confectioner operates and pays doctor $18 \le P \le 20$ to rearrange office	$22 + P$	$40 - P$	**62**
Not liable	Doctor rearranges his office at his own expense	22	60	**82**