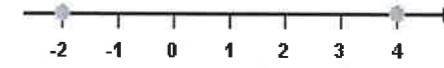
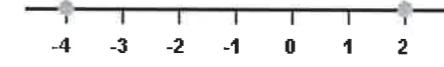
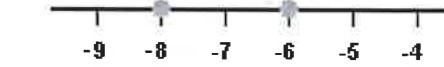


- 1202** a) $\frac{2}{3}$
c) $\frac{3}{11}$
- 1203** a) $\frac{6}{24}$
c) $\frac{20}{24}$
- 1204** a) $\frac{6}{6x}$
c) $\frac{10}{6x}$
- 1205** a) $3+h$
c) $h-8$
- 1206** a) $6+h$
- 1207** a) $\frac{1}{2}$
- 1208** a) $\frac{2}{x}$
- 1209** a) $\frac{2}{3x}$
- 1210** a) $\frac{7}{15}$
c) $\frac{x}{10}$
- 1211** a) $\frac{x^2}{3}$
c) $\frac{x-3}{60}$
- 1212** a) $\frac{7}{5}$
c) 9
- 1213** a) $\frac{3}{2}$
c) $\frac{3}{2}$
- 1214** a) $x=3, x=-7$
c) Defined for all x
- 1215** a) 2
c) $\frac{x^2}{3}$
- 1216** a) $\frac{11x-4}{12}$
- b) $\frac{4}{7}$
d) $\frac{1}{4}$
- b) $\frac{9}{24}$
d) $-\frac{30}{24}$
- b) $\frac{4x}{6x}$
d) $\frac{3x^2}{6x}$
- b) $5x+h$
d) $4x-3+h$
- b) $12+h$
- b) $\frac{53}{35}$
- b) $\frac{5}{2x}$
- b) $\frac{5}{12a}$
- b) $\frac{5}{16}$
d) $\frac{5}{14}$
- b) $\frac{9x^2}{10}$
d) $\frac{3+3x}{2}$
- b) $\frac{21}{25}$
d) $\frac{1}{27}$
- b) $\frac{1+x}{6x}$
d) $\frac{10x}{3}$
- b) $x=4$
d) $x=-2$
- b) $\frac{1}{6}$
- d) $\frac{4-2x}{5}$
- b) $\frac{7x+4}{12}$

- 1217** a) $\frac{5}{6}$
b) $\frac{2x+11}{15x}$
- 1218** a) $x=60$
b) $x=-9$
- 1219** a) $p=1$
b) $y=4$
- 1220** a) $x=1$
b) $t=0$
- 1221** a) $x=\frac{3}{2}$
b) $a=6$
- 1222** a) $x=2$
b) $x=\frac{6}{5}$
- 1223** a) $x=11$
b) $x=3$
- 1224** a) $x=0.5$
b) No solution
- 1225** a) $x=3$
b) $x=5$
- 1226** a) $x=-8$
b) $x=\frac{3}{2}$
- 1227** a) No solution
b) $x=-1$
- 1.3**
- 1301** a) 7
c) 15
- 1302** a) 2
c) 5
e) 1
g) 12
- 1303** a) The distance from x to 0 is 2.
b) The distance from x to 1 is 3.
- 
- 
- c) The distance from x to -1 is 3.
d) The distance from x to 7 is 1.
- 
- 
- 1304** a) $|x-3|$
c) $|x|=5$
- 1305** a) $x_1=5, x_2=-5$
c) $x_1=-1, x_2=3$
- 1306** a) $x=1$
c) No solution
- 1307** a) No
c) No
- 1308** a) The distance from x to 0 is less than or equal to 2.
- 
- b) The distance from x to 4 is less than or equal to 1.
- 
- c) The distance from x to -2 is less than or equal to 2.
- 
- d) The distance from x to 1 is equal to the distance from x to 3.
- 

- 1309** a) $|x| \leq 3$
c) $|x+3| \geq 3$
- 1310** a) $x_1 = \frac{1}{3}, x_2 = 1$
c) $x = \frac{1}{2}$
- 1311** a) $-4 < x < 4$
c) $-2 < x < 1$
- b) $|x| < 4$
d) $|x - \frac{3}{2}| < 3$
- b) $x_1 = -2, x_2 = 2, 8$
d) $x_1 = -\frac{4}{3}, x_2 = -6$
- b) $x \geq -2 \text{ or } x \leq -6$
d) $-\frac{1}{7} \leq x \leq 1$

1.4

- 1401** A, B and D
- 1402** a) 10
c) 2
- 1403** a) 19.7
c) 4.00
- 1404** 12
- 1405** 10 rows
- 1406** $1260 \text{ s} \approx 21 \text{ min}$
- 1407** 12180 kr
- 1408** 17
- 1409** $x \approx 1107$
- 1410** 6 m
- 1411** 8048 kr
- 1412** 44.2%
- b) $\frac{1}{3}$
d) -4
- b) 1.99
d) 683

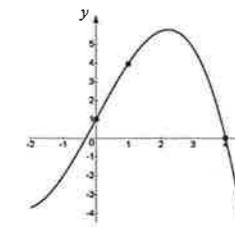
Chapter exercises 1

- 1** a) 9
b) 2
- 2** a) -12
b) 19
- 3** a) $|x| = 7$
c) 7 and -7
- 4** F
- 5** a) $-a^2 b$
c) $-\frac{1}{3}$
- 6** a) $\frac{s}{2}$
c) $\frac{3}{\pi r}$
- 7** a) $-3ab - b^2 - a + b$
b) $a^4 - 1$
- 8** a) $x = -0.2$
b) $x = \frac{35}{3}$
- 9** a) $x = \pm \frac{2}{3}$
c) $x_1 = 1, x_2 = 9$
- 10** a) $a = 0.5, b = -0.5$
b) $a = 1.25, b = -0.75$
- 11** 78 cm, 160 cm and 178 cm
- 12** a) $-a^2 + \frac{2a}{3} + \frac{1}{3}$
b) $\frac{2p^2}{9} - 1$

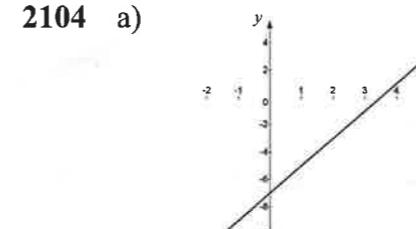
- 13** a) $\frac{6}{1-x}$
b) $\frac{6ab}{a^2 - 4b^2}$
- 14** a) $x = -6$
b) $r = 3.2$
- 15** a) $y_1 = -1, y_2 = -7$
b) $x_1 = 8, x_2 = 2$
- 16** a) 3
b) x
- 17** a) $|x+6| \leq 4$
b) $|x-6| \geq 7$
- 18** a) $x_1 = 2, x_2 = 3$
b) $x_1 = \frac{2}{3}, x_2 = -8$
- 19** a) $x(67.5 - x) = 687$
b) 55.0 m and 12.5 m

Chapter 2**2.1**

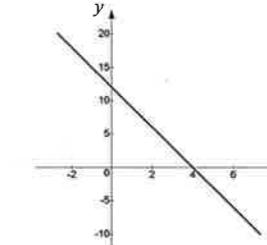
- 2101** a) -5
c) (3, -9)
- 2102** Any curve through the points (0, 1), (1, 4) and (4, 0), for example:



- 2103** a) x can take any value
c) $x \neq 1$

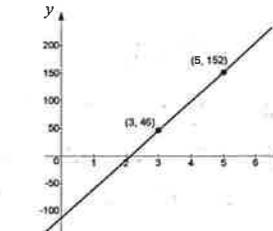
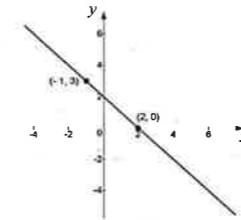


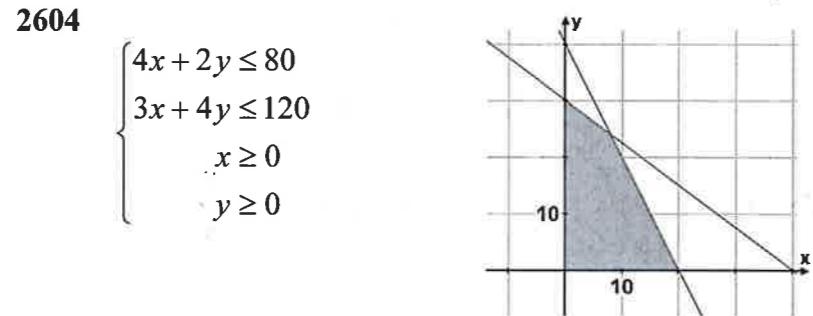
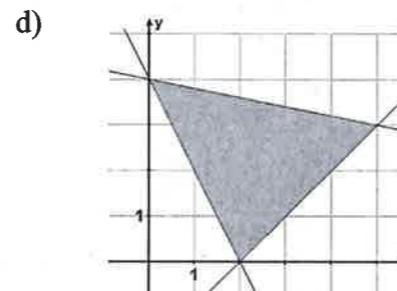
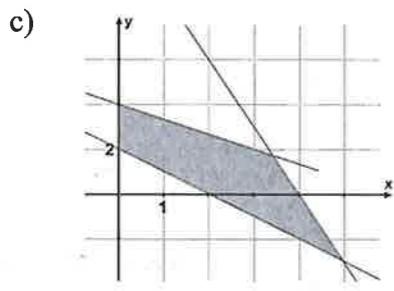
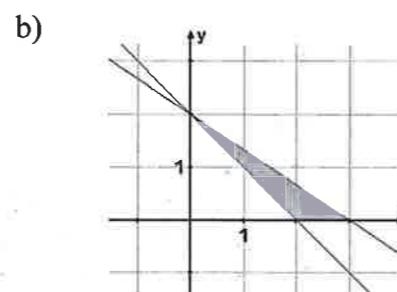
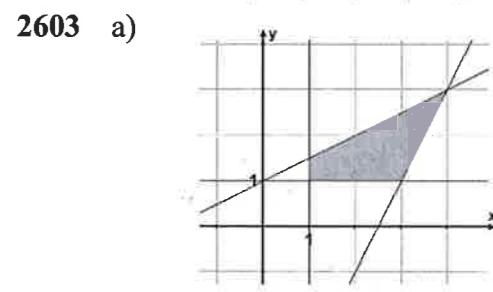
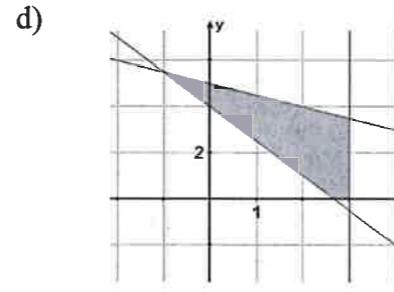
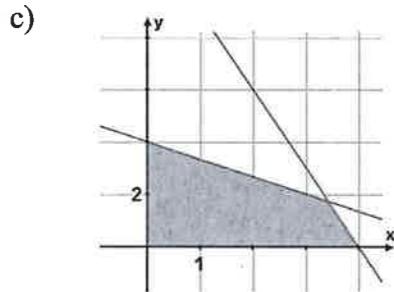
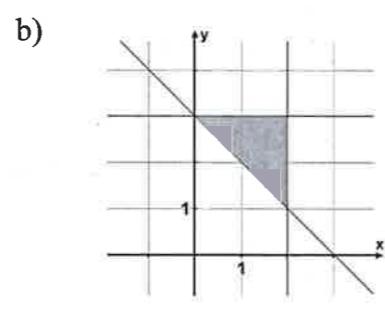
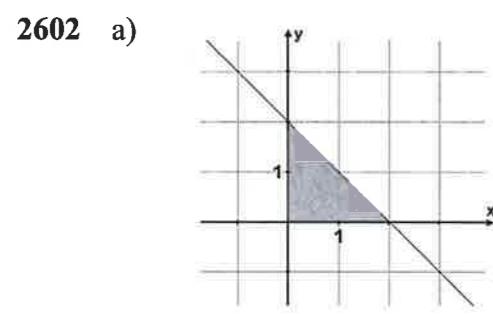
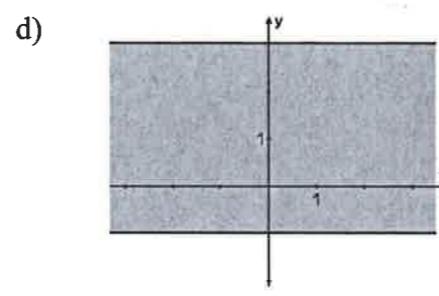
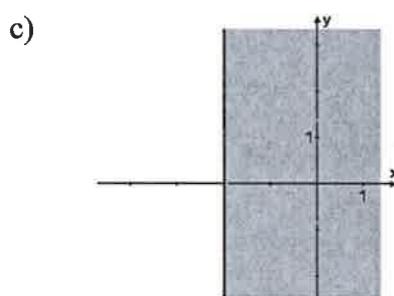
- 2105** a) Decreasing
b) At $y = 12$
c) At $x = 4$



- 2106** Increasing: B and D
Decreasing: A and C

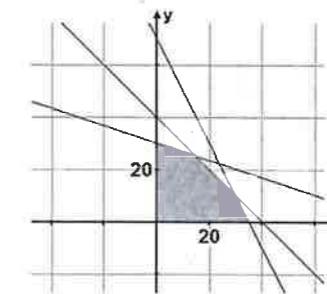
- 2107** a) $m = -1$
b) $m = 53$





2605

$$\begin{cases} 2x + y \leq 70 \\ x + y \leq 40 \\ x + 3y \leq 90 \\ y \geq 0 \\ x \geq 0 \end{cases}$$



2606 a) 14

b) 15

2607 a) 38

b) 17

c) 29

d) 23

2608 15 units of A and 25 units of B (maximum profit = 10500 kr)

2609 $z_{\min} = 10$

2610 50 stars and 350 Santas (maximum profit = 13750 kr)

2611 50 units of Food 1 and 300 units of Food 2 (cost = 115 kr)

2.7

- | | |
|-------------------------------|--------------------------------|
| 2701 a) 0 | b) -3 |
| c) 0 | d) 0 |
| e) 0 | f) -1 |
| 2702 a) -4 | b) $\frac{1}{3}$ |
| c) Doesn't exist (∞) | d) 1 |
| 2703 a) 3 | b) -6 |
| c) $\frac{2}{3}$ | d) 0 |
| 2704 a) Doesn't exist | b) 0 |
| c) -2 | d) $\frac{20}{3} \approx 6.67$ |

Chapter exercises 2

- 1 $C = 0.25x$
- 2 a) £23 b) 240 units
c) Standing charge: £5 d) $C = 5 + 0.05x$
- 3 Two lines are parallel if they have the same gradient.
- 4 A, C and D
- 5 $a = 19$
- 6 a) 3 b) -3
c) 0.5 d) $\frac{2}{3}$
- 7 a) $x \neq 0.5$ b) $x \neq 1$ and -9
- 8 a) $-\frac{1}{11}$ b) $\frac{15}{11}$
- 9 a) Continuous everywhere b) Continuous everywhere
- 10 a) A b) E
c) C d) B
- 11 a) C b) B
c) A
- 12 a) $y = -3x - 4$ b) $y = -3x + \frac{7}{4}$

- 3605 a) -29.6
c) -7.02
3606 a) $y' = 6e^{2x}$
- 3607 a) $x = \ln 2 \approx 0.693$
c) No solution
- 3608 $C = 2$
3609 $C = 200, k = 2$
3610 $C = 100, k = 0.03$
- 3611 a) $y' = 3ae^{ax} - 3ae^{3x}$
c) $y' = \frac{2}{3}(a-b)e^{(a-b)x}$
- 3612 a) e^{x+3}
c) $5 \cdot 3^x \cdot \ln 3 \approx 5.5 \cdot 3^x$
- 3613 $N_0 = 100, k = \ln 2 \approx 0.693$
3614 $C = 1.5, k = 1$

Chapter exercises 3

- 1 50
2 a) $f'(x) = x^2 + e^{3x}$ b) $f'(x) = 15x^4 + 5e^{-x}$
3 a) $f''(x) = 0$ b) $f''(x) = 6x^2 - 5x^3$
4 a) $f''(3) = 18$ b) $f''(-2) = -576$
5 a) 18.25. The height of the ball after 2.5 s is 18.25 m.
b) -6. The speed of the ball after 2.5 s is -6 m/s (the ball is moving down).
6 $x = 0.693$
7 $(0, 0)$ and $(-\frac{2}{3}, \frac{4}{27})$
8 12
9 a) -1.5 b) 0.375
10 a) 83104. The total cost of producing 120 units is 83104 kr.
b) 348. The marginal cost ('the cost of producing one unit more') after 120 units produced is 348 kr.
11 a) $f''(x) = 24x^2 + 40x^3$ b) $f''(x) = 2$
12 a) $f'(1.75) = 23.24$ b) $f'(-0.5) = 1.65$
13 a) 0.560 b) 1.679
14 a) 3 b) $\frac{1}{2}$
15 a) $f'(x) = -\frac{1}{(x+2)^2}$ b) $f'(x) = \frac{-1}{(x-1)^2}$
16 a) 8 km/h
b) Moving forward from 0 to 1 h. Moving backwards between 1 h and 1 h 40 min. Then moving forward again.
17 a) 119000. The initial value of the machine was 119000 kr.
b) 53470. The value of the machine after five years was 53470 kr.
c) -8600. When the machine is 5 years old, its value decreases by 8600 kr/year.
d) -13100. The average decrease in value during the first five years was 13100 kr/year.

- 18 a) After 19 seconds, the speed is 18 m/s.
b) After 19 s, the speed is not changing (the acceleration is 0).
c) After 19 s, the speed is about to decrease.
19 85000 kr
20 $y = \frac{x^2}{3} - \frac{4x}{3} + 1$
21 $(\frac{1}{4}, \frac{17}{4})$

Chapter 4**4.1**

- 4101 1
4102 -5
4103 $y = 7x - 4$
4104 $y = 5x - 1$
4105 $y = 3x + 1$
4106 $y = 1.5x - 3$
4107 (3, 15)
4108 $y = -6x - 8$ or $y = 5.5 - 6x$
4109 At (0, 0) and (2, -2)
4110 $y = -0.5x + 2$
4111 $y = 0.5x - 0.5$
4112 $y = x - 2$

4.2

- 4201 a) $1 \leq x \leq 2, x \geq 4$ b) $x \leq 1, 2 \leq x \leq 4$
c) $x < 1, 2 < x < 4$ d) $1 < x < 2, x > 4$
e) $x = 1, 2$ or 4
4202 f' positive: e
 f' negative: b, g
 f' zero: c, f, h
 f' does not exist: a, d
4203 a) $x < 0, x > 3$ b) $0 < x < 3$
4204 a) Increasing for $x \leq 1$ b) Increasing for $x \leq 0$ or $x \geq 2$
Decreasing for $x \geq 1$ Decreasing for $0 \leq x \leq 2$
c) Decreasing for all x d) Increasing for $x \leq -1$ or $0 \leq x \leq 1$
Decreasing for $-1 \leq x \leq 0$ or $x \geq 1$
4205 a) Decreasing b) Increasing
4206 a) Minimum point at (1, -1) b) Minimum point at (-1, -2)
Maximum point at (0, -1)
4207 B (maximum value: -1) and C (maximum value: 1.25)
4208 A (minimum value: -5) and C (minimum value: -5.25)
4209 a) Minimum point at (0, -4) b) Minimum point at (2, -8)
Maximum point at (2, 0) Maximum point at (-1, 19)
c) Terrace point at (0, 0) d) Minimum point at (-1, 2)
Minimum point at (1, -1) Maximum point at (1, 6)
4210 Minimum point at $x = 1$, maximum point at $x = 3$.

