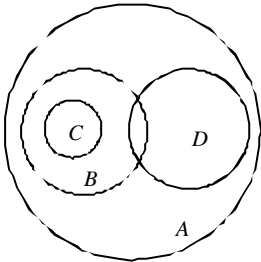


Svör

Svör við verkefnum

Verkefni 1

- | | | |
|------|------|------|
| a) 0 | b) 1 | c) 1 |
| d) 0 | e) 0 | f) 0 |
| g) 1 | h) 1 | i) 0 |
| j) 1 | k) 0 | l) 0 |
| m) 0 | n) 1 | o) 0 |
| p) 0 | | |
- | | | |
|---------------------------------|------------------------------|------------|
| a) \emptyset | b) \emptyset | c) $\{0\}$ |
| d) \emptyset | e) $\{-\sqrt{3}, \sqrt{3}\}$ | |
| f) $\{-\sqrt{3}, 0, \sqrt{3}\}$ | | |
-



- Rétt fyrir öll mengi er staðhæfing a).
Til að hinar verði réttar þarf

b) $A = \emptyset$	c) $A = B$	d) $A = \emptyset$
e) $A \subseteq B$	f) $A \cap B = \emptyset$	
- | | | |
|----------------|----------------|--------|
| a) \emptyset | b) U | c) A |
| d) B | e) B | f) A |
| g) U | h) \emptyset | |
- Reglan gildir.
- 23
- | | |
|--|-------------------------------|
| a) U | b) $U \setminus \{1, 9, 15\}$ |
| c) $\{3, 5, 7, 11, 13, 17, 19\}$ | |
| d) \emptyset | e) \emptyset |
| f) $\{1, 9, 15\}$ | |
| g) $\{4, 6, 8, 10, 12, 14, 16, 18, 20\}$ | |
| h) $B \cup \{2\}$ | |
- | | |
|------|-------|
| a) 7 | b) 12 |
|------|-------|

Verkefni 2

- | | | |
|----------------------------------|-----------------------------|----------------------------------|
| a) 2^4 | b) 2^6 | c) $2^2 \cdot 5^2$ |
| d) 5^3 | e) $2^2 \cdot 3 \cdot 5^2$ | f) $2^2 \cdot 3^3 \cdot 5^2$ |
| g) 3^8 | h) $3^2 \cdot 7 \cdot 11^2$ | i) $2 \cdot 5 \cdot 11 \cdot 13$ |
| j) $3 \cdot 5 \cdot 13 \cdot 17$ | k) $11 \cdot 13 \cdot 23$ | l) $13^2 \cdot 29$ |
- | | | |
|-----------|-----------|------------|
| a) 4, 5 | b) 45, 5 | c) -5, 4 |
| d) -46, 4 | e) 484, 3 | f) -485, 6 |
- | | | |
|-------|-------|-------|
| a) 8 | b) 12 | c) 5 |
| d) 24 | e) 16 | f) 15 |
| g) 8 | h) 12 | |
- | | | |
|-------|-------|------|
| a) 14 | b) 21 | c) 1 |
|-------|-------|------|
- | | | |
|-------|---------|----------|
| a) 84 | b) 8778 | c) 18018 |
|-------|---------|----------|
- | | | |
|------|------|------|
| a) 2 | b) 1 | c) 1 |
| d) 1 | e) 5 | f) 7 |
- | | | |
|-------|---------|---------|
| a) 12 | b) 20 | c) 60 |
| c) 60 | e) 4200 | f) 8820 |
- | | | |
|-------------------|-------------------|------------------|
| a) $\frac{1}{75}$ | b) $\frac{3}{4}$ | c) $\frac{5}{7}$ |
| d) $\frac{3}{4}$ | e) $\frac{9}{13}$ | f) $\frac{8}{9}$ |
- | | | |
|-------------------|-------------------|------------------|
| a) $\frac{2}{5}$ | b) $\frac{8}{39}$ | c) $\frac{8}{9}$ |
| d) $\frac{9}{10}$ | e) $\frac{3}{10}$ | f) $\frac{6}{5}$ |
- | | | |
|---------------------|---------------------|---------------------|
| a) 10 | b) $16\frac{1}{14}$ | c) 1 |
| d) $1\frac{16}{75}$ | e) $5\frac{4}{9}$ | f) $1\frac{43}{48}$ |
- | | | |
|-------|--------|-------|
| a) 12 | b) 126 | c) 18 |
|-------|--------|-------|
- | | | |
|------------------|------------------|------------------|
| a) $\frac{1}{4}$ | b) 4 | c) $\frac{3}{7}$ |
| d) $\frac{1}{6}$ | e) $\frac{1}{2}$ | f) $\frac{7}{9}$ |
- | | | |
|------|------------------|-------------------|
| a) 4 | b) $\frac{1}{4}$ | c) $2\frac{1}{3}$ |
| d) 6 | e) 2 | f) $1\frac{2}{7}$ |
- | | | |
|--------------------|-------------------|--------------------|
| a) $\frac{1}{2}$ | b) $\frac{5}{6}$ | c) $\frac{31}{35}$ |
| d) $\frac{19}{33}$ | e) $2\frac{5}{6}$ | f) $2\frac{5}{8}$ |
- | | | |
|------------------|------------------|-------------------|
| a) $\frac{2}{3}$ | b) $\frac{1}{6}$ | c) $1\frac{5}{7}$ |
|------------------|------------------|-------------------|

2 Svör við verkefnum

- d) $-1\frac{2}{3}$ e) $\frac{5}{6}$ f) $\frac{4}{15}$
 16. a) $1\frac{1}{6}$ b) $3\frac{26}{35}$ c) $\frac{26}{33}$
 d) $\frac{5}{36}$ e) $1\frac{1}{24}$ f) $\frac{23}{24}$
 17. a) $\frac{11}{15}$ b) $\frac{1}{2}$ c) $\frac{11}{72}$
 18. a) $-\frac{1}{24}$ b) $\frac{1}{272}$ c) $\frac{13}{60}$
 19. a) $5\frac{4}{9}$ b) $3\frac{17}{21}$ c) $\frac{4}{5}$
 d) $\frac{9}{14}$
 20. a) $\frac{9}{104}$ b) $\frac{23}{36}$ c) $180\frac{5}{9}$

d) $13\frac{16}{21}$
 21. $\frac{5}{8} < \frac{11}{16} < \frac{7}{10} < \frac{17}{24} < \frac{13}{15} < \frac{11}{12}$.

Mismunurinn er $\frac{23}{48}$.

22. $29\frac{17}{36}$
 23. a) $0.\underline{384615}$ b) $3.\underline{3571428}$
 c) $0.\underline{270}$ d) $2.\underline{047619}$
 e) $0.\underline{745}$ f) $0.\underline{971153846}$

24. a) $\frac{38}{111}$ b) $\frac{26}{111}$ c) $4\frac{2}{15}$
 d) $\frac{91}{909}$ e) $\frac{1369}{11111}$ f) $1\frac{44761}{99000}$

25. a) $\frac{1}{5}$ b) 5
 26. a) $\frac{9}{4}$ b) $\frac{1}{12}$

27. a) $\frac{4}{15}$ b) $\frac{9}{4}$
 28. a) $\frac{32}{135}$ b) $\frac{16}{9}$

29. a) $\frac{6}{49}$ b) $\frac{-3}{2}$
 30. a) 2 b) 4

31. a) $\frac{5}{3}$ b) $\frac{40}{11}$
 32. a) 2 b) $\frac{21}{22}$

33. 1

34. $\frac{31}{80}$

35. a) $x = \begin{cases} 4 \\ 10 \end{cases}$ b) $x = \begin{cases} -4 \\ -10 \end{cases}$

c) $x = \begin{cases} 2 \\ 5 \end{cases}$ d) $x = \begin{cases} -2 \\ \frac{4}{3} \end{cases}$

e) $x = \frac{-3}{2}$ f) $x = \begin{cases} 4\frac{37}{50} \\ -2\frac{3}{50} \end{cases}$

36. a) $\{x \in \mathbb{R} \mid -3 \leq x < 1\}$
 b) $\{x \in \mathbb{R} \mid 0 < x < 5\}$
 c) $\{x \in \mathbb{R} \mid x \leq 0\} \cup \{x \in \mathbb{R} \mid 5 \leq x\}$
 d) $\{x \in \mathbb{R} \mid -3 \leq x < 5\}$
 e) $\{x \in \mathbb{R} \mid 0 < x < 1\}$
 f) $\{x \in \mathbb{R} \mid x \leq -3\}$
 g) $\{x \in \mathbb{R} \mid x > 0\}$
 h) $x \in \mathbb{R}$

37. $V = \frac{62500p}{1029}$, $Y = \frac{2500p}{49}$
 a) $V = 195.4$, $Y = 162.9$
 b) $V = 190.6$, $Y = 160.2$
 c) $V = 190.7$, $Y = 160.2$

Verkefni 3

- $m^2 + 2mn + n^2$
- $x^2 + 18x + 81$
- $x^2 - 18x + 81$
- $4x^2 + 12x + 9$
- $4x^2 - 12x + 9$
- $x^2 + 10x + 25$
- $x^2 - 10x + 25$
- $9a^2x^2 + 12ax + 4$
- $9x^2 + 12ax + 4a^2$
- $25p^4q^2 - 20p^2qr + 4r^2$
- $p^2 - 2pq + q^2$
- $x^2 - 49$
- $25 - a^2$
- $4x^2 - 1$
- $9x^2 - 4$
- $p^2 - q^2$

17. $9x^2p^2 - 4y^2q^2$

18. $9p^2 - 4q^2$

19. $81x^4 - 1$

20. $a^4 - 50a^2 + 625$

21. $64x^3 + y^3$

22. $x^6 - 8y^3$

23. a) 10000

b) 2500

c) 1914000

d) 1828000

e) 1000000

f) 8100

g) 1000000

24. $(x+3)^2$

25. $(x-3)^2$

26. $(x+3)(x-3)$

27. $(x+z)^2$

28. $(a-p)^2$

29. $(y+q)(y-q)$

30. $(5x+y)^2$

31. $3(x+z)^2$

32. $x(a-p)^2$

33. $2(3x+2y)(3x-2y)$

34. $(2x+5a)(2x-5a)$

35. $4(p+1)(p-1)$

36. $2(2a-1)^2$

37. $(a+b)(a-b+y)$

38. $(3a-x)(3a+x-1)$

39. $y(7x+3y)^2$

40. $(x+y+z)(x+y-z)$

41. $(x+y-z)(x-y+z)$

42. $2(2x+5a)^2$

43. $2(x+5)^2$

44. $(x+7)(x-1)$

45. $(x+2)(x-6)$

46. $(x-2)(x-4)$

47. $(x-3+\sqrt{2})(x-3-\sqrt{2})$

48. $(x-y)(x+y-k)$

49. $(x+2)^2(x-2)^2$

50. $(x-y)^2$

51. $8xy(x^2+y^2)$

52. $(x+\frac{1}{3})(x+\frac{1}{2})$

53. $(x-\frac{1}{3})(x+\frac{1}{2})$

54. $(x+\frac{1}{3})(x-\frac{1}{2})$

55. $(x-\frac{1}{4})(x+\frac{1}{3})$

56. $(x+\frac{1}{4}) \cdot (x-\frac{1}{3})$

57. $(x+2+\sqrt{2})(x+2-\sqrt{2})$

58. $(x+2+\sqrt{3})(x+2-\sqrt{3})$

59. $8(x+y)(x^2-xy+y^2)$

60. $(x-2y)(x^2+2xy+4y^2)$

61. 4

62. -4

63. $\frac{1}{x-3}$

64. $2x-4$

65. $\frac{a-b}{c}$

66. $\frac{a^2-b^2}{a^2}$

67. $2x-3$

68. $\frac{h-6}{h+6}$

69. $\frac{3(x+6)}{5(x-6)}$

70. $x+3$

71. $\frac{x+2}{2x-4}$

72. $\frac{2x-1}{4x+1}$

4 Svör við verkefnum

$$73. \frac{1}{x(x-1)}$$

$$74. \frac{3x-2}{x^2(x-1)}$$

$$75. \frac{-x+1}{x^2(x+1)}$$

$$76. \frac{4x^2-12x-3}{x(2x-1)(2x+1)}$$

$$77. 0$$

$$78. \frac{-4(4x+5)}{(x+2)(x-1)(x+1)}$$

$$79. 1$$

$$80. -\frac{a+5}{a(a-1)}$$

$$81. \frac{2(x^2+1)}{x^2-1}$$

$$82. \frac{1}{x+2}$$

$$83. \frac{1}{x+2}$$

$$84. \frac{1}{4}$$

$$85. \frac{-x^2-5x+19}{(3x+10)(x-1)(x-3)}$$

$$86. \frac{5}{(m-3)(m+2)}$$

$$87. \frac{2x}{x^6-1}$$

$$88. \frac{1}{(1+a)(1-a)}$$

$$89. \frac{x^2+3}{(x+1)^2(x-1)^2}$$

$$90. -\frac{2x(x+y)}{y^2}$$

$$91. \frac{a^4+a^2+1}{a^2}$$

$$92. \frac{c}{a}$$

Verkefni 4

1. $x = -4$ eða $x = 20$

2. $x = -16$ eða $x = 9$

3. $x = -4 \pm \sqrt{11}$

4. $x = 5$ eða $x = \frac{1}{3}$

5. $x = \frac{-11 \pm \sqrt{97}}{12}$

6. $x = -1$ eða $x = -0.1$

7. Engin lausn

8. $x = \pm \frac{\sqrt{2}}{2}$

9. $x = -2$ eða $x = 1$

10. $x = -2$ eða $x = 1$

11. $x = -0.5$ eða $x = -1.5$

12. $x = -1$ eða $x = 2.5$

13. $x = 1$ eða $x = 0.5$

14. $x = 1$ eða $x = 0.5$

15. $x = 1$ eða $x = 0.5$

16. $x = 0.4$ eða $x = 3$

17. $x = \frac{3 \pm \sqrt{5}}{2}$

18. $x = \frac{1}{2}$

19. $b = 4, c = 3$

20. 1) $t = 1$ og $x_2 = 1$

2) $t = 2$ og $x_2 = 4$

21. a) $t < 25$

b) $t = 25$

c) $t > 25$

22. 29 og 17

23. 49 og 127

24. 4.5 klst

25. 25 cm (eða 20 cm)

26. 20 km/klst

27. $x = 0$ eða $x = -4 \pm \sqrt{7}$

28. $x = 2$ eða $x = -1$

29. $x = \pm 1$ eða $x = 5$

30. $x = \sqrt[4]{a^3}$ eða $x = \pm 2$

31. $x = \pm \sqrt{3}$

32. $x = 5$ eða $x = -2$

33. $x = 4, x = \frac{1}{4}$ eða $x = \frac{3 \pm \sqrt{5}}{2}$

34. $x = \frac{-3 \pm \sqrt{5}}{2}$ eða $x = \frac{5 \pm \sqrt{21}}{2}$

35. 16 og -80
 36. $-\sqrt{7}$ og -144
 37. $-\frac{5}{3}$ og $-\frac{\sqrt{11}}{3}$
 38. 1.25 og 0.25
 39. $\frac{2}{3}$ og $-\frac{1}{3}$
 40. $x = 3$ eða $x = -7$
 41. $x = \frac{9}{2}$ eða $x = \frac{3}{2}$
 42. $x = 2$ eða $x = -1$
 43. $x = 2$ eða $x = 0$
 44. $x = \frac{5}{2}$ eða $x = -\frac{3}{4}$
 45. $\{x \mid x > -3\}$.
 46. $\{x \mid x \leq -3\}$.
 47. $\{x \mid x > 1\}$.
 48. $\{x \mid x < 1\}$.
 49. $\{x \mid x < -4\}$.
 50. $\{x \mid x > -4\}$.
 51. $\{x \mid x > -1\}$.
 52. $\{x \mid x \leq -1\}$.
 53. $\{x \mid x < 11\}$.
 54. $\{x \mid x > 11\}$.
 55. $\{x \mid x \geq 1\}$.
 56. $\{x \mid x < 5\}$.
 57. $\{x \mid x > -1\}$.
 58. $\{x \mid x \leq -1\}$.
 59. $\{x \mid x \leq \frac{61}{33}\}$.
 60. $\{x \mid -4 \leq x \leq 20\}$.
 61. $\{x \mid -9 \leq x \leq 16\}$.
 62. $\{x \mid x \leq 4 - \sqrt{11}\} \cup \{x \mid 4 - \sqrt{11} \leq x\}$.
 63. $\{x \mid x < \frac{1}{3}\} \cup \{x \mid 5 < x\}$.
 64. $\{x \mid \frac{-11 - \sqrt{97}}{2} < x < \frac{-11 + \sqrt{97}}{2}\}$.
 65. $\{x \mid -1 < x < -0.1\}$.
 66. \mathbb{R} .
 67. $\{x \mid \frac{-\sqrt{2}}{2} < x < \frac{\sqrt{2}}{2}\}$.
 68. $\{x \mid -2 < x < 1\}$.
 69. $\{x \mid x \leq -2\} \cup \{x \mid 1 \leq x\}$.

70. $\{x \mid x \leq \frac{-3}{2}\} \cup \{x \mid \frac{-1}{2} \leq x\}$.
 71. $\{x \mid -1 < x < 2.5\}$.
 72. $\{x \mid -7 < x < 3\}$.
 73. $\{x \mid x \leq 1.5\} \cup \{x \mid 4.5 \leq x\}$.
 74. $\{x \mid x \leq -1\} \cup \{x \mid 2 \leq x\}$.
 75. $\{x \mid x < 0\} \cup \{x \mid 2 < x\}$.
 76. $\{x \mid x < \frac{-3}{4}\} \cup \{x \mid \frac{5}{2} < x\}$.

Verkefni 5

1. a) 1, b) 10^{-80} , c) 10 d) $\frac{1}{2048}$,
 e) 32, f) $\frac{625}{8}$
 2. a) $b^{-3}c$, b) $x^{-4}z^{-1}$, c) 64,
 d) $8a^3$, e) a^{12} ,
 f) $-\frac{1}{8}a^2 + 8a^{-2}$
 3. a) 5, b) $a^4 - a^{-4}$ c) $2x^4y^{-1}$,
 d) $\frac{1}{72a^3}$, e) $(ab)^{3n}$
 4. a) $\frac{7}{8}$, b) $\frac{19}{40}$, c) $81a^{-3}b^{12}$,
 d) $4b^{-2}c^{-27}$, e) a^2b^{-2} , f) $6xy$
 5. a) 500 s, b) 1.016 ns,
 c) 333.3 zs
 6. a) $\sqrt{2}$, b) 20, c) $4\sqrt[3]{3}$,
 d) 18, e) $\sqrt{6}$, f) $\sqrt{5}$
 7. a) $\sqrt[60]{a^{53}}$, b) $a^3\sqrt{a}$, c) ab ,
 d) 1, e) $3\sqrt{5} - 3\sqrt{3}$,
 f) 15
 8. a) 0, b) $\sqrt[3]{a}$, c) $\frac{x}{y}$, d) $\frac{1}{\sqrt[12]{b}}$,
 e) x , f) $a\sqrt[6]{b^5}$
 9. a) 2, b) $4 + \sqrt{2}$, c) $\frac{4\sqrt{ab}}{a-b}$,
 d) $2\sqrt{3}$, e) $\sqrt{5} + \frac{7}{3}\sqrt{2}$,
 f) $\frac{5}{11}$, g) $\sqrt{22}$
 10. $\sqrt[3]{4} - \sqrt[3]{2} = 0.3275$ m

6 Svör við verkefnum

11. a) 3, b) 0.04, c) 5, d) 0.5,

e) $2^{\frac{11}{3}} \cdot 3^{-\frac{2}{3}}$, f) 32

12. a) $2^{-\frac{59}{10}} \cdot 3^{-1}$, b) $2^{-1} \cdot 3^{\frac{1}{2}} \cdot 5^{\frac{1}{2}}$,

c) 2, d) x^2 , e) $a^{\frac{x}{x+1}}$ f) $2^{\frac{3}{2}}$

13. a) $2^{\frac{1}{2}}$, b) 20, c) $4 \cdot 3^{\frac{1}{3}}$,

d) 18, e) $a^{\frac{53}{60}}$, f) $a^{\frac{7}{2}}$, g) ab

14. a) $x = 64$, b) $x = 25$, c) $x = 1$,

d) $x = 2^{12}$, e) $x = 1$ eða $x = 2^{10}$

f) $(x+1)(10x+1)$

g) $(3x+1)(x-\sqrt{5})(x+\sqrt{5})$

h) $2(5x-2)\left(x-\frac{\sqrt{2}}{2}\right)\left(x+\frac{\sqrt{2}}{2}\right)$

13.a) 0 ef $x = -16$ eða $x = 9$,

neikvæð ef $-16 < x < 9$,

jákvæð annars.

b) 0 ef $x = -4 \pm \sqrt{11}$,

neikvæð ef $-4 - \sqrt{11} < x < -4 + \sqrt{11}$,

jákvæð annars.

c) 0 ef $x = -1.5$, $x = -0.5$ eða $x = 0$,

jákvæð ef $x > 0$ eða $-1.5 < x < -0.5$,

neikvæð annars.

d) 0 ef $x = -\sqrt{5}$, $x = 0$ eða $x = \sqrt{5}$,

jákvæð ef $x < -\sqrt{5}$ eða $0 < x < \sqrt{5}$,

neikvæð annars.

e) 0 ef $x = 1 - \sqrt{3}$ eða $x = 1 + \sqrt{3}$,

jákvæð ef $1 - \sqrt{3} < x < 1 + \sqrt{3}$,

neikvæð annars.

f) Margliðan er jákvæð fyrir öll x .

Verkefni 6

1. Stig Stuðlar
- a) 1 1 8
- b) 0 4
- c) 1 5 0
- d) 2 -2 0 12
- e) 5 2 4 0 1 0 -1
- f) 10 1 0 0 0 0 -1 0 0 0 0 0

2. $Q(x) = x + 1$, $R(x) = 0$.

3. $Q(x) = x - 1$, $R(x) = 2$.

4. $Q(x) = x^2 - x + 1$, $R(x) = 0$.

5. $Q(x) = x^2 - x + 1$, $R(x) = -2$.

6. $Q(x) = x^2 + 2x + 1$, $R(x) = 0$.

7. $Q(x) = x^4 + x^3 - x^2 - x - 1$, $R(x) = 0$.

8. $Q(x) = 2x^2 - 2$, $R(x) = -3$.

9. $Q(x) = 3x^3 + \frac{1}{2}x^2$, $R(x) = -6x^3 - x^2$.

- 10.a) $\frac{-1}{5}$ b) -3 c) 0
- d) 0 e) 0 og 2 f) 0 og -2
- g) 2 og -2 h) -1 i) 2 og -8
- j) 2 og -2

11. a) $R(x) = P(2) = 67584$

b) $P(x) = x + 1$

12.a) $(x+4)(x-20)$ b) $(x-9)(x+16)$

c) $(x+4+\sqrt{11})(x+4-\sqrt{11})$

d) $(x-5)(3x-1)$

e) $6\left(x + \frac{11-\sqrt{97}}{12}\right)\left(x + \frac{11+\sqrt{97}}{12}\right)$

Verkefni 7

1. a) $h = -\frac{5}{2}$, $Q = (0, -2)$, $P = \left(-\frac{4}{5}, 0\right)$

b) $h = \frac{1}{2}$, $Q = \left(0, \frac{7}{2}\right)$, $P = (-7, 0)$

c) $h = -\frac{2}{5}$, $Q = \left(0, \frac{1}{5}\right)$, $P = \left(\frac{1}{2}, 0\right)$

d) $h = 0$, $Q = (0, 5)$, sker ekki x -ás.

e) $h = \frac{7}{5}$, $Q = (0, -2)$, $P = \left(-\frac{4}{5}, 0\right)$

f) $P = (-2, 0)$, hefur hvorki halltölu né skurðpunkt við y -ás.

2. a) $5x - 4y - 13 = 0$

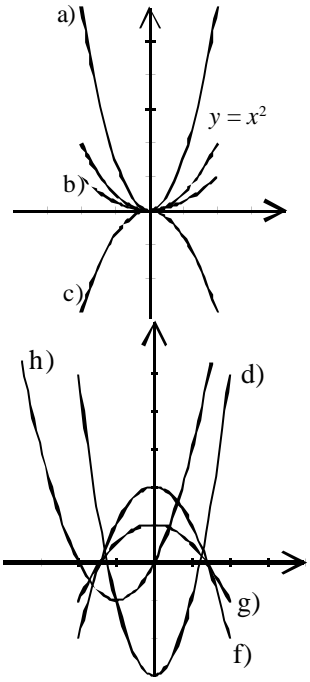
b) $3x - y + 4 = 0$

c) $4x - y - 11 = 0$

d) $y + 5 = 0$

e) $x + 8 = 0$

3.



$$x = \frac{3}{2}$$

b) $P_1 = (-4, 0), P_2 = (-1, 0)$
 $Q = (0, -4), T = (-\frac{5}{2}, \frac{9}{4})$

$$x = -\frac{5}{2}$$

c) $P_1 = (-3, 0), P_2 = (\frac{5}{2}, 0)$
 $Q = (0, -15), T = (-\frac{1}{4}, -\frac{121}{8})$

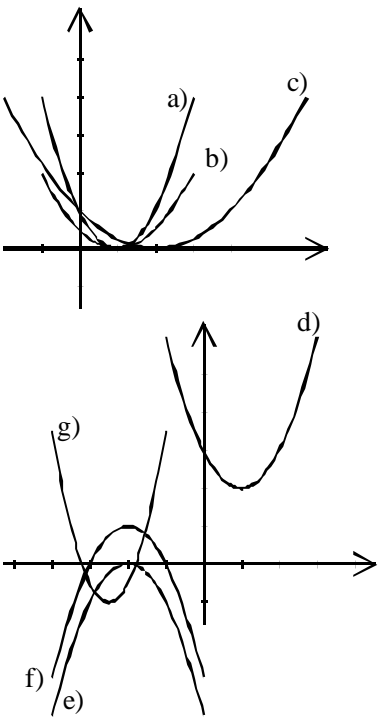
$$x = -\frac{1}{4}$$

d) sker ekki x -ás, $Q = (0, 5)$
 $T = (\frac{1}{2}, \frac{19}{4}), x = \frac{1}{2}$

e) $P_1 = (-7 - \sqrt{51}, 0), P_2 = (-7 + \sqrt{51}, 0)$
 $Q = (0, -1), T = (-7, -\frac{51}{2}), x = -7$

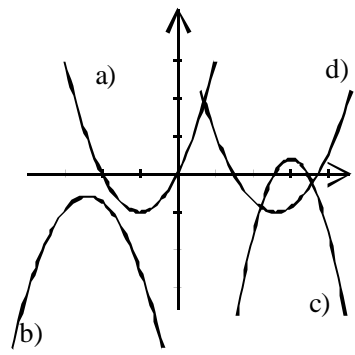
f) $P_1 = (-2 - \frac{4}{3}\sqrt{3}, 0), P_2 = (-2 + \frac{4}{3}\sqrt{3}, 0)$
 $Q = (0, 2), T = (-2, 8), x = -2$

4.



5. a) $P_1 = (1, 0), P_2 = (2, 0)$
 $Q = (0, 2), T = (\frac{3}{2}, -\frac{1}{4})$

6.



7. a) $S_1 = (-2\sqrt{2}, 3), S_2 = (2\sqrt{2}, 3)$

b) Enginn skurðpunktur

c) $S_1 = (1, -4), S_2 = (0, -5)$

d) $S_1 = (-1, -4), S_2 = (\frac{1}{3}, -4\frac{8}{9})$

e) $S_1 = (\frac{-3-\sqrt{33}}{3}, \frac{-1+2\sqrt{33}}{3})$

$$S_2 = (\frac{-3+\sqrt{33}}{3}, \frac{-1-2\sqrt{33}}{3})$$

8. a) $S_1 = (-3, 4), S_2 = (3, 4)$

b) $S_1 = (-1, -4), S_2 = (3, 4)$

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c) $S_1 = (-6, 31)$, $S_2 = (2, -1)$

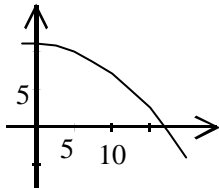
d) $S_1 = (4, 11)$

e) $S_1 = \left(\frac{-1-2\sqrt{13}}{3}, \frac{8+4\sqrt{13}}{9} \right)$

$S_2 = \left(\frac{-1+2\sqrt{13}}{3}, \frac{8-4\sqrt{13}}{9} \right)$

f) $S = (2, -1)$

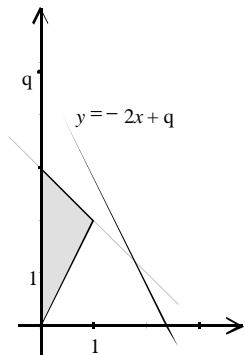
9. a)



b) $x = 4 \cdot \sqrt{15} \text{ m} = 15.49 \text{ m}$

c) 9 m

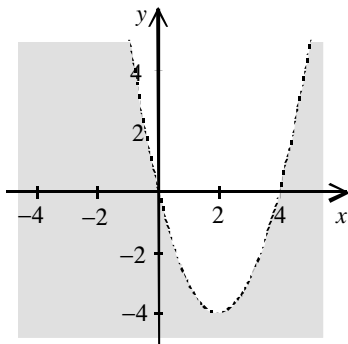
10. $q = 4$



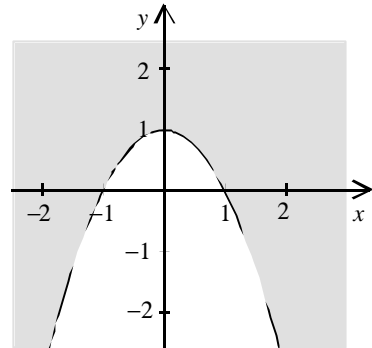
11.a) Nei b) Já c) Nei

12. $y \leq 2x + 2$, $y > -x + 3$, $x < 2$

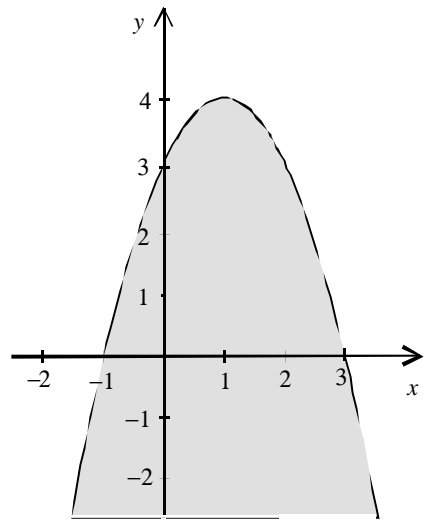
13.a)



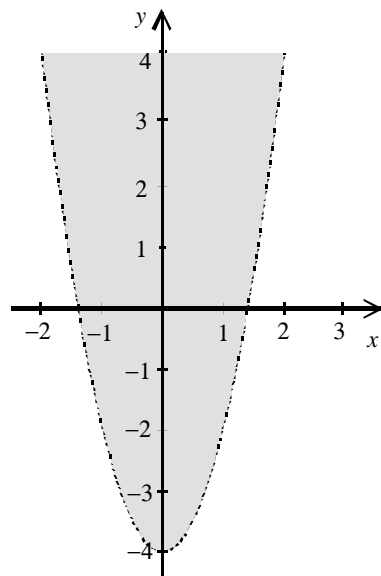
b)



c)



d)



Verkefni 8

1. a), b), f) og g)
2. a) $f(0) = -3$, $f(1.2) = 3$ og $f(-0.6) = -6$
 b) $x = 3$ c) $x = \frac{3}{4}$ d) $[13, 2]$
3. a) $f(0) = -3$, $f(-2) = 3$, $f(5) = 17$
 b) $x = -5$ eða $x = 6$
 c) $x = -1$ og $x = 3$ d) $[-\frac{13}{4}, 9]$
4. a) \mathbb{R} b) \mathbb{R} c) $\mathbb{R} \setminus \{-1\}$
 d) \mathbb{R} e) $\mathbb{R} \setminus \{0, 4\}$ f) $\mathbb{R} \setminus \{1\}$
 g) $\{x \in \mathbb{R} \mid x \geq \frac{1}{3}\}$ h) $\{x \in \mathbb{R} \mid x > \frac{1}{3}\}$
5. a) $x = \begin{cases} 1 \\ -2 \end{cases}$ b) $x = \begin{cases} 1 + \sqrt{3} \\ 1 - \sqrt{3} \end{cases}$
 c) $x = \begin{cases} 2 + \sqrt{3} \\ 2 - \sqrt{3} \end{cases}$ d) $x = \begin{cases} 0 \\ 2 \end{cases}$
6. $y = 100 + \frac{5000}{x}$
7. a) $V_f = [5, \infty[$ b) $V_f = \mathbf{R}$
 c) $V_f = \{y \in \mathbf{R} \mid y \leq 1\}$ d) $V_f = \mathbf{R} \setminus \{3\}$
8. a) $D_f = \mathbf{R}$, $V_f = \{y \in \mathbf{R} \mid y \leq 4\}$
 b) $D_f = \mathbf{R} \setminus \{-1\}$, $V_f = \mathbf{R} \setminus \{0\}$
 c) $D_f = \mathbf{R} \setminus \{-6\}$, $V_f = \mathbf{R} \setminus \{-1\}$
 d) $D_f = \{x \in \mathbf{R} \mid x \geq -4\}$,
 $V_f = \{y \in \mathbf{R} \mid y \geq 0\}$
 e) $D_f = \{x \in \mathbf{R} \mid x > -4\}$,
 $V_f = \{y \in \mathbf{R} \mid y > 0\}$
 f) $D_f = [-1, 1]$, $V_f = [0, 1]$
9. Sönnun, svari sleppt.
10. Sönnun, svari sleppt.

11. a) $(f + g)(x) = x^3 + 2x^2$
 $(f - g)(x) = x^3 - 2x^2 - 2x$
 $(f \cdot g)(x) = 2x^5 + x^4 - 2x^3 - x^2$

$$\left(\frac{f}{g}\right)(x) = \frac{x^3 - x}{2x^2 + x}$$

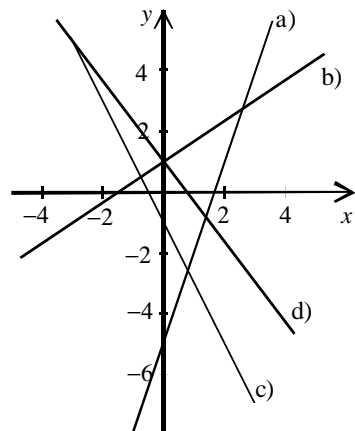
b) $(f + g)(x) = \frac{x^2 + x - 3}{x(x - 3)}$
 $(f - g)(x) = \frac{-x^2 + x - 3}{x(x - 3)}$
 $(f \cdot g)(x) = \frac{x}{x(x - 3)}$

$$\left(\frac{f}{g}\right)(x) = \frac{x - 3}{x^2}$$

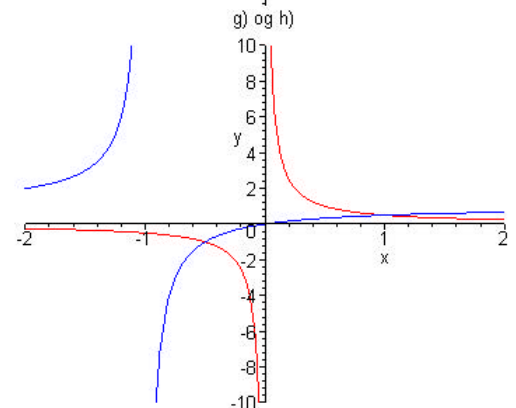
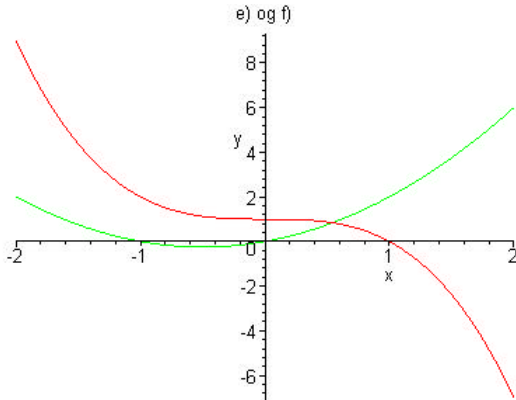
c) $(f + g)(x) = 3\sqrt{x} - 1$
 $(f - g)(x) = \sqrt{x} + 1$
 $(f \cdot g)(x) = 2x - 2\sqrt{x}$
 $\left(\frac{f}{g}\right)(x) = \frac{2\sqrt{x}}{\sqrt{x} - 1}$

d) $(f + g)(x) = \frac{5x^2 + 5}{3x^2 - x - 2}$
 $(f - g)(x) = \frac{x^2 + 10x - 1}{3x^2 - x - 2}$
 $(f \cdot g)(x) = \frac{2x^2 - x - 3}{3x^2 - x - 2}$
 $\left(\frac{f}{g}\right)(x) = \frac{3x^2 + 5x + 2}{2x^2 - 5x + 3}$

12.



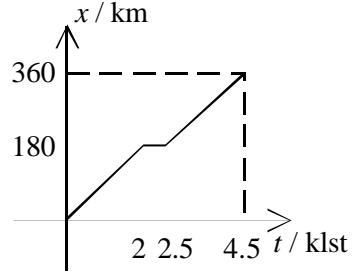
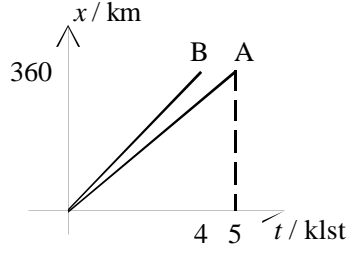
10 Svör við verkefnum



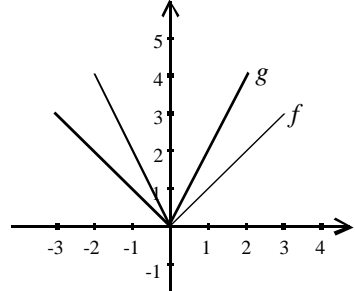
- 13.a) $D_f = [-2, 2]$
 b) $f(-1) = 4, f(0) = 1, f(2) = 8$
 c) $x \in \{-1.2, -0.8, 1\}$
 d) $V_f = [-1, 8]$
 e) $[1, 4]$

- 14.a) hvorugt, b) jafnt,
 c) ójafnt, d) ójafnt,
 e) ójafnt, f) hvorugt

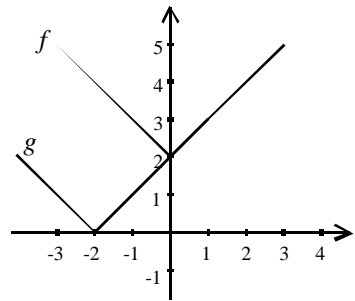
- 15.a) $x = 72t$
 b)



16.a)

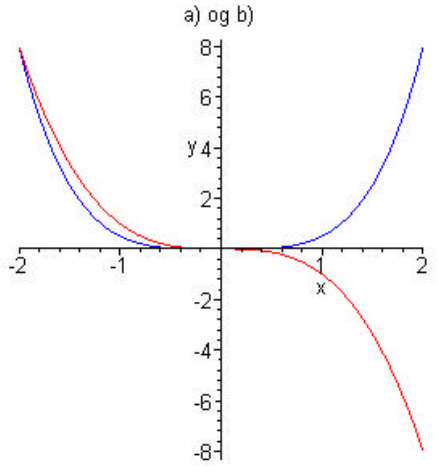


b)

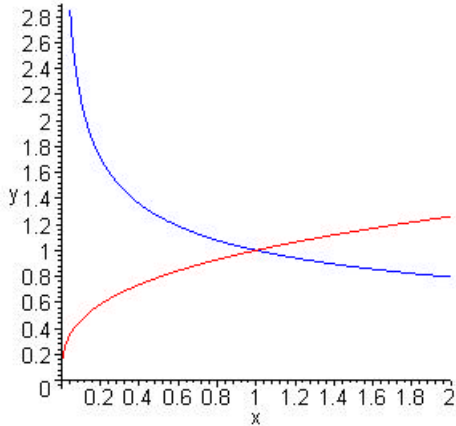


- 17.a) $x \in \{-11, 1\}$ b) $x \in \{-0.5, 5.5\}$
 c) $x = -\frac{5}{3}$ d) $x \in \{\frac{5}{3}, 5\}$

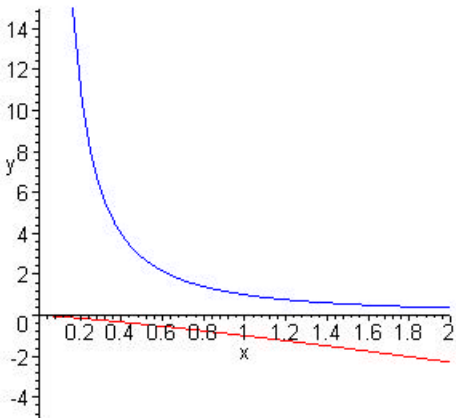
18.



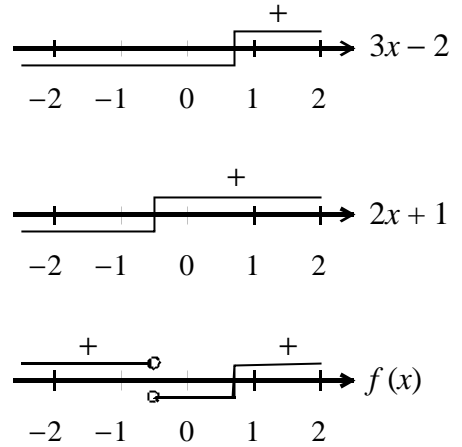
c) og d)



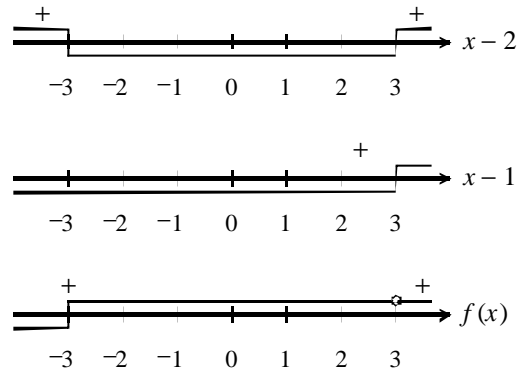
e) og f)



21.a)

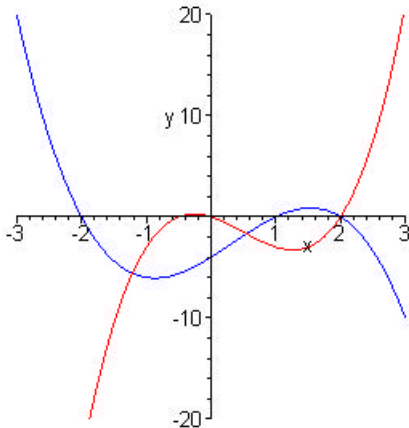


b)



19.

a) og b)



20. $P(x) = -x^2 + 3x + 2$

22. $k = 0, K = 1$

23.a) Hágildi $(3, 8), (-3, 8)$

Lággildi $(0, -1)$

b) Hágildi $(3, 64), (-3, 64)$

Lággildi $(1, 0), (-1, 0)$

c) Hágildi $(-3, 36)$

Lággildi $(3, -18)$

24. a) Ummálið er $U = 2h + x(1 + \sqrt{2}) = 12,$

en flatarmálið er $F = hx + \frac{1}{4}x^2$. Með

því að leysa fyrri jöfnuna m.t.t. h og setja inn í formúluna fyrir F fæst niðurstaðan.

b) $x \approx 3.13$ m, $F(3.13) \approx 9.40334$ m²

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25.b) $x_2 - x_1 > 0$

$$f(x_2) - f(x_1) = \frac{3}{2}(x_2 - x_1) > 0$$

a) $x_2 > x_1 > 1$

$$f(x_2) - f(x_1) = 2(x_2 - x_1)(x_2 + x_1 - 2) > 0$$

c) $x_2 - x_1 > 0$

$$f(x_2) - f(x_1) = \frac{x_2 - x_1}{\sqrt{x_2 - 1} + \sqrt{x_1 - 1}} > 0$$

d) ef $x \geq 1$ er $f(x) = x + 1$

ef $x < 1$ er $f(x) = 3x - 1$

Í báðum tilvikum er f einhalla vaxandi.

26.a) $-\infty < A \leq -\frac{5}{2}$ b) $A \geq 0$

27.a) staðbundið hággildi $f(0) = 4$

ekkert staðbundið lággildi.

b) staðbundið hággildi $f\left(-\sqrt{\frac{4}{3}}\right) = \frac{8}{3}\sqrt{\frac{4}{3}}$,

staðbundið lággildi $f\left(\sqrt{\frac{4}{3}}\right) = -\frac{8}{3}\sqrt{\frac{4}{3}}$

