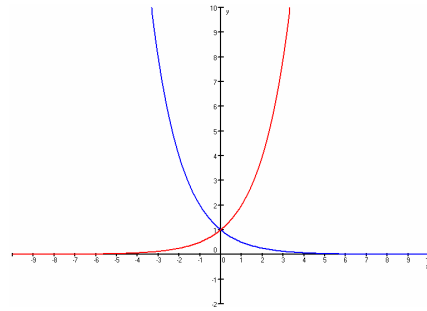


## 10.4 Exponentiële functies

### Opgave 42:

- De grafiek van  $g$  ontstaat door de grafiek van  $f$  te spiegelen in de  $x$ -as.
- $y = 0$
- $B_f = \langle 0, \rightarrow \rangle$   
 $B_g = \langle 0, \rightarrow \rangle$

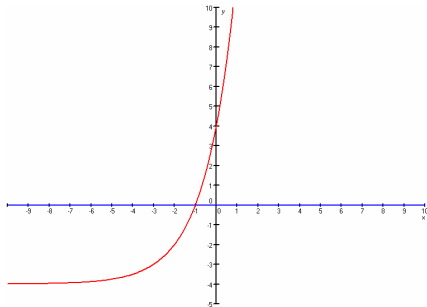


### Opgave 43:

- $T(0,3)$
- $T(5,0)$
- $V_{x-as,3}$

### Opgave 44:

- translatie over  $(-3, -4)$
- 



- $B_f = \langle -4, \rightarrow \rangle$
- $y_1 = 2^{x+3} - 4$  en  $y_2 = 2$   
intersect geeft  $x = -0,42$   
dus  $x \leq -0,42$
  - $f(3) = 60$   
dus  $-4 < x \leq 60$

### Opgave 45:

- translatie over  $(1,5)$   
H.A.:  $y = 5$
- translatie over  $(-1,0)$  daarna vermenigvuldiging t.o.v. de  $x$ -as met 5  
H.A.:  $y = 0$
- translatie over  $(0,-7)$  daarna vermenigvuldiging t.o.v. de  $x$ -as met 4  
H.A.:  $y = -7$
- translatie over  $(0,3)$  daarna vermenigvuldiging t.o.v. de  $x$ -as met -2  
H.A.:  $y = 3$

### Opgave 46:

- $f$ : translatie over  $(0,-2)$   
 $g$ : translatie over  $(2,2)$

- b.  $B_f = \langle -2, \rightarrow \rangle$   
 $B_g = \langle 2, \rightarrow \rangle$
- c.  $g(4) = 2\frac{1}{4}$   
 $2 < g(x) \leq 2\frac{1}{4}$
- d.  $y_1 = 2^x - 2$  en  $y_2 = (\frac{1}{2})^{x-2} + 2$   
intersect geeft:  $x = 2,27$   
dus  $x \leq 2,27$

**Opgave 47:**

$$y_1 = y_6 \quad y_2 = y_4 \quad y_3 = y_5$$

**Opgave 48:**

- a.  $x^5 \cdot \sqrt{x} = x^5 \cdot x^{\frac{1}{2}} = x^{5\frac{1}{2}}$
- b.  $\frac{\sqrt{x}}{x^3} = \frac{x^{\frac{1}{2}}}{x^3} = x^{-2\frac{1}{2}}$
- c.  $\frac{1}{x\sqrt{x}} = \frac{1}{x^1 \cdot x^{\frac{1}{2}}} = \frac{1}{x^{1\frac{1}{2}}} = x^{-1\frac{1}{2}}$
- d.  $x^3 \cdot x^{2,4} = x^{5,4}$
- e.  $\frac{x^4 \cdot \sqrt[3]{x}}{\sqrt[5]{x^2}} = \frac{x^4 \cdot x^{\frac{1}{3}}}{x^{\frac{2}{5}}} = \frac{x^{4\frac{1}{3}}}{x^{\frac{2}{5}}} = x^{3\frac{14}{15}}$
- f.  $x^5 \cdot x^{-\frac{1}{5}} \cdot x = x^{5\frac{4}{5}}$

**Opgave 49:**

- a.  $y = \frac{5}{x^4} = 5x^{-4}$
- b.  $y = 3x^2 \cdot \sqrt{x} = 3x^2 \cdot x^{\frac{1}{2}} = 3x^{2\frac{1}{2}}$
- c.  $y = \frac{1}{5x} = \frac{1}{5}x^{-1}$
- d.  $y = 5x \cdot \sqrt[4]{x} = 5x \cdot x^{\frac{1}{4}} = 5x^{1\frac{1}{4}}$
- e.  $y = \frac{3\sqrt{x}}{x^2} = \frac{3x^{\frac{1}{2}}}{x^2} = 3x^{-1\frac{1}{2}}$
- f.  $y = 8\sqrt{x} \cdot \sqrt[4]{x^3} = 8x^{\frac{1}{2}} \cdot x^{\frac{3}{4}} = 8x^{1\frac{1}{4}}$
- g.  $y = (3x^2)^3 \cdot x^5 = 27x^6 \cdot x^5 = 27x^{11}$
- h.  $y = 28 \cdot (4x)^{-1} \cdot \frac{1}{x} = 28 \cdot \frac{1}{4} \cdot x^{-1} \cdot x^{-1} = 7x^{-2}$
- i.  $y = \sqrt[3]{x} \cdot \sqrt[4]{x} = x^{\frac{1}{3}} \cdot x^{\frac{1}{4}} = x^{\frac{7}{12}}$

**Opgave 50:**

- a.  $N = 80 \cdot 2^{2t-4}$   
 $N = 80 \cdot 2^{2t} \cdot 2^{-4}$

$$N = 80 \cdot (2^2)^t \cdot \frac{1}{16}$$

$$N = 5 \cdot 4^t$$

b.  $N = 2500 \cdot 5^{-t-2}$

$$N = 2500 \cdot 5^{-t} \cdot 5^{-2}$$

$$N = 2500 \cdot (5^{-1})^t \cdot \frac{1}{25}$$

$$N = 100 \cdot \left(\frac{1}{5}\right)^t$$

c.  $N = \frac{100}{2^{2t}}$

$$N = 100 \cdot 2^{-2t}$$

$$N = 100 \cdot (2^{-2})^t$$

$$N = 100 \cdot \left(\frac{1}{4}\right)^t$$

**Opgave 51:**

a.  $32 = 2^5$

b.  $\frac{1}{2} = 2^{-1}$

c.  $\sqrt[4]{2} = 2^{\frac{1}{4}}$

d.  $16 \cdot \sqrt{2} = 2^4 \cdot 2^{\frac{1}{2}} = 2^{4\frac{1}{2}}$

e.  $1 = 2^0$

f.  $\frac{1}{2}\sqrt{2} = 2^{-1} \cdot 2^{\frac{1}{2}} = 2^{-\frac{1}{2}}$

**Opgave 52:**

a.  $2^{x+1} = 64$

$$2^{x+1} = 2^6$$

$$x+1 = 6$$

$$x = 5$$

b.  $2^{x-2} = \frac{1}{8}$

$$2^{x-2} = \frac{1}{2^3}$$

$$2^{x-2} = 2^{-3}$$

$$x-2 = -3$$

$$x = -1$$

c.  $3^{2x+1} = 27\sqrt{3}$

$$3^{2x+1} = 3^3 \cdot 3^{\frac{1}{2}}$$

$$3^{2x+1} = 3^{3\frac{1}{2}}$$

$$2x+1 = 3\frac{1}{2}$$

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

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

d.  $5^{-x+6} = 625$

$$5^{-x+6} = 5^4$$

$$-x+6 = 4$$

$$-x = -2$$

$$x = 2$$

- e.  $3^x - 2 = 25$   
 $3^x = 27$   
 $3^x = 3^3$   
 $x = 3$
- f.  $5 \cdot 2^x + 11 = 91$   
 $5 \cdot 2^x = 80$   
 $2^x = 16$   
 $2^x = 2^4$   
 $x = 4$
- g.  $2^x = 1$   
 $2^x = 2^0$   
 $x = 0$
- h.  $2^{x-3} = \left(\frac{1}{2}\right)^{x-5}$   
 $2^{x-3} = (2^{-1})^{x-5}$   
 $2^{x-3} = 2^{-x+5}$   
 $x-3 = -x+5$   
 $2x = 8$   
 $x = 4$
- i.  $2^{x+3} = 8^{x+2}$   
 $2^{x+3} = (2^3)^{x+2}$   
 $2^{x+3} = 2^{3x+6}$   
 $x+3 = 3x+6$   
 $-2x = 3$   
 $x = -1\frac{1}{2}$

**Opgave 53:**

- a.  $2^{3x+5} = 16\sqrt{2}$   
 $2^{3x+5} = 2^4 \cdot 2^{\frac{1}{2}}$   
 $2^{3x+5} = 2^{4\frac{1}{2}}$   
 $3x+5 = 4\frac{1}{2}$   
 $3x = -\frac{1}{2}$   
 $x = -\frac{1}{6}$
- b.  $3^{4x} = \frac{1}{81} \cdot \sqrt[4]{9}$   
 $3^{4x} = \frac{1}{3^4} \cdot \sqrt[4]{3^2}$   
 $3^{4x} = 3^{-4} \cdot 3^{\frac{2}{4}}$   
 $3^{4x} = 3^{-3\frac{1}{2}}$   
 $4x = -3\frac{1}{2}$   
 $x = -\frac{7}{8}$
- c.  $3 \cdot 5^{2x-1} = 0,6$   
 $5^{2x-1} = 0,2$   
 $5^{2x-1} = \frac{1}{5}$

$$5^{2x-1} = 5^{-1}$$

$$2x - 1 = -1$$

$$2x = 0$$

$$x = 0$$

d.  $9^{3x-3} = 3^{x+4}$

$$(3^2)^{3x-3} = 3^{x+4}$$

$$3^{6x-6} = 3^{x+4}$$

$$6x - 6 = x + 4$$

$$5x = 10$$

$$x = 2$$

e.  $3 \cdot 2^{x-1} - 1 = -0,25$

$$3 \cdot 2^{x-1} = 0,75$$

$$2^{x-1} = 0,25$$

$$2^{x-1} = \frac{1}{2^2}$$

$$2^{x-1} = 2^{-2}$$

$$x - 1 = -2$$

$$x = -1$$

f.  $3 \cdot 5^{2x+1} = 75\sqrt{5}$

$$5^{2x+1} = 25\sqrt{5}$$

$$5^{2x+1} = 5^2 \cdot 5^{\frac{1}{2}}$$

$$5^{2x+1} = 5^{2\frac{1}{2}}$$

$$2x + 1 = 2\frac{1}{2}$$

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

$$x = \frac{3}{4}$$