

## HOOFDSTUK 3: De afgeleide functie.

### 3.5 Toepassingen van de afgeleide.

#### Opgave 49:

- a.  $f'(x) = 2x - 3$   
 $f'(4) = 5$   
 $f(4) = 3$
- b.  $f(4)$
- c.  $f'(4)$

#### Opgave 50:

- a.  $y_A = f(4) = 2$   
 $f'(x) = 1,5x^2 - 4x$   
 $rc = f'(4) = 8$   
 $y = 8x + b$  door  $(4,2)$   
 $2 = 32 + b$   
 $b = -30$   
 $k: y = 8x - 30$
- b.  $y_B = f(-2) = -10$   
 $rc = f'(-2) = 14$   
 $y = 14x + b$  door  $(-2,-10)$   
 $-10 = -28 + b$   
 $b = 18$   
 $m: y = 14x + 18$

#### Opgave 51:

- a.  $y_A = g(-3) = 36$   
 $g'(x) = 4x - 6$   
 $rc = g'(-3) = -18$   
 $y = -18x + b$  door  $(-3,36)$   
 $36 = 54 + b$   
 $b = -18$   
 $l: y = -18x - 18$
- b.  $2x^2 - 6x = 0$   
 $2x(x - 3) = 0$   
 $x = 0 \vee x = 3$   
 $rc = g'(3) = 6$   
 $y = 6x + b$  door  $(3,0)$   
 $0 = 18 + b$   
 $b = -18$   
 $n: y = 6x - 18$

**Opgave 52:**

a.  $f(x) = (x^2 - 4)(x + 1) = x^3 + x^2 - 4x - 4$

$$y_A = f(-3) = -10$$

$$f'(x) = 3x^2 + 2x - 4$$

$$rc = f'(-3) = 17$$

$$y = 17x + b \text{ door } (-3, -10)$$

$$-10 = -51 + b$$

$$b = 41$$

$$k: y = 17x + 41$$

b.  $y_B = f(0) = -4$

$$rc = f'(0) = -4$$

$$y = -4x + b \text{ door } (0, -4)$$

$$-4 = b$$

$$l: y = -4x - 4$$

c.  $(x^2 - 4)(x + 1) = 0$

$$x^2 = 4 \quad \vee \quad x = -1$$

$$x = 2 \quad \vee \quad x = -2 \quad \vee \quad x = -1$$

$$rc = f'(2) = 12$$

$$y = 12x + b \text{ door } (2, 0)$$

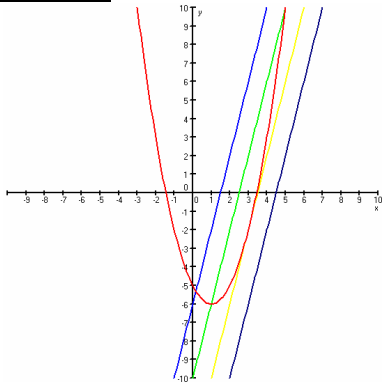
$$0 = 24 + b$$

$$b = -24$$

$$m: y = 12x - 24$$

**Opgave 53:**

a.



b.  $y = 4x - 14$

c.  $f'(x_R) = 4$

**Opgave 54:**

a.  $f'(x) = -2x + 2$

$$-2x + 2 = 4$$

$$-2x = 2$$

$$x = -1$$

$$y_A = f(-1) = 0$$

$$A(-1, 0)$$

b.  $rc_k = rc_l = -6$   
 $f'(x) = -2x + 2 = -6$   
 $-2x = -8$   
 $x = 4$   
 $y_B = f(4) = -5$   
 $B(4, -5)$

**Opgave 55:**

a.  $f'(x) = 1,5x^2 - 3$   
 $1,5x^2 - 3 = 3$   
 $1,5x^2 = 6$   
 $x^2 = 4$   
 $x = 2 \vee x = -2$   
 $y = f(2) = -4 \vee y = f(-2) = 0$   
 $(2, -4)$  en  $(-2, 0)$

b.  $rc = 0$   
 $f'(x) = 1,5x^2 - 3 = 0$   
 $1,5x^2 = 3$   
 $x^2 = 2$   
 $x = \sqrt{2} \vee x = -\sqrt{2}$

**Opgave 56:**

a.  $y_p = f(4) = 4\frac{1}{3}$   
 $f'(x) = x^2 - 2x$   
 $rc = f'(4) = 8$   
 $y = 8x + b$  door  $(4, 4\frac{1}{3})$   
 $4\frac{1}{3} = 32 + b$   
 $b = -27\frac{2}{3}$   
 $k: y = 8x - 27\frac{2}{3}$

b.  $f'(x) = x^2 - 2x = 3$   
 $x^2 - 2x - 3 = 0$   
 $(x+1)(x-3) = 0$   
 $x = -1 \vee x = 3$   
 $y = f(-1) = -2\frac{1}{3} \vee y = f(3) = -1$   
 $Q(-1, -2\frac{1}{3})$   $R(3, -1)$

c.  $f'(x) = x^2 - 2x = 0$   
 $x(x-2) = 0$   
 $x = 0 \vee x = 2$   
 $y = f(0) = -1 \vee y = f(2) = -2\frac{1}{3}$   
 $(0, -1)$  en  $(2, -2\frac{1}{3})$

d.  $y_1 = \frac{1}{3}x^3 - x^2 - 1$  calcmenu optie zero geeft  $x_A = 3,28$

calcmenu optie 6 geeft  $\left[ \frac{dy}{dx} \right]_{x=3,28} = 4,19$

$$f'(x) = x^2 - 2x = 4,19$$

$y_1 = x^2 - 2x$  en  $y_2 = 4,19$  calcmenu optie intersection geeft  $x_B = -1,28$

$$y_B = f(-1,28) = -3,33$$

$$B(-1,28; -3,33)$$

### **Opgave 57:**

a.  $v(t) = s'(t) = 1,6t$

$$v(3) = s'(3) = 4,8 \text{ m/s}$$

$$v(6) = s'(6) = 9,6 \text{ m/s}$$

b.  $30 \text{ km/uur} = 8\frac{1}{3} \text{ m/s}$

$$1,6t = 8\frac{1}{3}$$

$$t = 5,21$$

c.  $s(5) = 20 \text{ m}$

d.  $s(6) = 28,8$

na 6 seconden blijft de snelheid  $9,6 \text{ m/s}$

dus  $s(10) = 28,8 + 4 \cdot 9,6 = 67,2 \text{ m}$

### **Opgave 58:**

a.  $v(t) = h'(t) = -10t + 25$

$$v(0) = h'(0) = 25 \text{ m/s}$$

b.  $v(3) = h'(3) = -5 \text{ m/s}$  (de bal gaat dus weer omlaag)

c. op het hoogste punt is de snelheid 0

$$v(t) = h'(t) = -10t + 25 = 0$$

$$-10t = -25$$

$$t = 2,5$$

d.  $h(t) = -5t^2 + 25t = 0$

$$-5t(t - 5) = 0$$

$$t = 0 \quad \vee \quad t = 5$$

Dus na 5 seconden is de bal weer op de grond.

$$v(5) = h'(5) = -25 \text{ m/s}$$