

12.5 De kettingregel

Opgave 55:

- $p = 2 \quad A = 20$
- $p = 10 \quad A = 500$

Opgave 56:

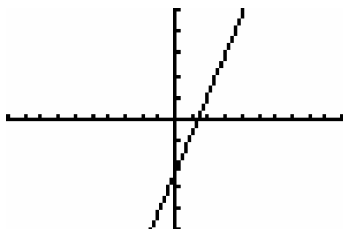
- $y = 5(2x + 3)^4 + 1$
- $y = 4\sqrt{3x - 1}$
- $y = \frac{18}{x^2 - 6}$
- $y = 3(5 - x)^4$
- $y = 2\sqrt{x^3 + 2} + 3$
- $y = 2^{5x-3}$

Opgave 57:

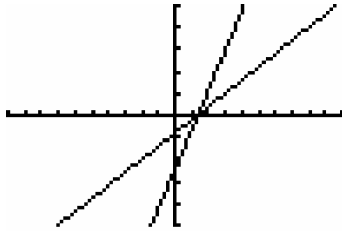
- $y = 2(3x - 7)^2$
 $y = 2u^2$ met $u = 3x - 7$
- $y = 5\sqrt{3x + 1}$
 $y = 5\sqrt{u}$ met $u = 3x + 1$
- $y = 2,5(4x + 7,1)^{1,6}$
 $y = 2,5u^{1,6}$ met $u = 4x + 7,1$
- $y = 6(x^2 + 1)^3 - 8$
 $y = 6u^3 - 8$ met $u = x^2 + 1$
- $y = \frac{5}{(3x + 2)^2}$
 $y = \frac{5}{u^2}$ met $u = 3x + 2$
- $y = 8 - 3\sqrt{5 - x^2}$
 $y = 8 - 3\sqrt{u}$ met $u = 5 - x^2$

Opgave 58:

a.



b.



c. $y = (3x - 4)^2 = 9x^2 - 24x + 16$

$$\frac{dy}{dx} = 18x - 24$$

d. factor 3

Opgave 59:

a. $y = -3(2x - 5)^6 = -3u^6$ met $u = 2x - 5$ dus $u' = 2$

$$y' = -18u^5 \cdot u' = -18(2x - 5)^5 \cdot 2 = -36(2x - 5)^5$$

b. $y = (x - 4x^2)^5 = u^5$ met $u = x - 4x^2$ dus $u' = 1 - 8x$

$$y' = 5u^4 \cdot u' = 5(x - 4x^2)^4 \cdot (1 - 8x)$$

c. $y = \frac{8}{(3x + 2)^4} = 8(3x + 2)^{-4} = 8u^{-4}$ met $u = 3x + 2$ dus $u' = 3$

$$y' = -32u^{-5} \cdot u' = -32(3x + 2)^{-5} \cdot 3 = -\frac{96}{(3x + 2)^5}$$

d. $y = 2\sqrt{3 - 7x} = 2\sqrt{u} = 2u^{\frac{1}{2}}$ met $u = 3 - 7x$ dus $u' = -7$

$$y' = u^{-\frac{1}{2}} \cdot u' = (3 - 7x)^{-\frac{1}{2}} \cdot -7 = -\frac{7}{\sqrt{3 - 7x}}$$

e. $y = \frac{4}{(2 - x^2)^3} = 4(2 - x^2)^{-3} = 4u^{-3}$ met $u = 2 - x^2$ dus $u' = -2x$

$$y' = -12u^{-4} \cdot u' = -12(2 - x^2)^{-4} \cdot -2x = \frac{24x}{(2 - x^2)^4}$$

f. $y = \sqrt{3 + x^2} = \sqrt{u} = u^{\frac{1}{2}}$ met $u = 3 + x^2$ dus $u' = 2x$

$$y' = \frac{1}{2}u^{-\frac{1}{2}} \cdot u' = \frac{1}{2}(3 + x^2)^{-\frac{1}{2}} \cdot 2x = \frac{x}{\sqrt{3 + x^2}}$$

Opgave 60:

a. $S = \frac{2}{(3 - a^2)^5} = \frac{2}{u^5} = 2u^{-5}$ met $u = 3 - a^2$ dus $u' = -2a$

$$S' = -10u^{-6} \cdot u' = -10(3 - a^2)^{-6} \cdot -2a = \frac{20a}{(3 - a^2)^6}$$

b. $K = \sqrt{2q + 1} = \sqrt{u} = u^{\frac{1}{2}}$ met $u = 2q + 1$ dus $u' = 2$

$$K' = \frac{1}{2}u^{-\frac{1}{2}} \cdot u' = \frac{1}{2}(2q + 1)^{-\frac{1}{2}} \cdot 2 = \frac{1}{\sqrt{2q + 1}}$$

c. $W = 6(p^2 - 2p + 5)^{0.7} = 6u^{0.7}$ met $u = p^2 - 2p + 5$ dus $u' = 2p - 2$

$$W' = 4,2u^{-0.3} \cdot u' = 4,2(p^2 - 2p + 5)^{-0.3} \cdot (2p - 2)$$

Opgave 61:

a. $y = (5q + 2)^4 - 3q + 1$

$$y' = 4(5q + 2)^3 \cdot 5 - 3 = 20(5q + 2)^3 - 3$$

b. $y = \frac{5}{(x+1)^8} + 4x^2 = 5(1+x)^{-8} + 4x^2$

$$y' = -40(1+x)^{-9} \cdot 1 + 8x = -\frac{40}{(1+x)^9} + 8x$$

Opgave 62:

a. $TK = 1000\sqrt{q^3 + 10} = 1000\sqrt{u} = 1000u^{\frac{1}{2}}$ met $u = q^3 + 10$ dus $u' = 3q^2$

$$TK' = 500u^{-\frac{1}{2}} \cdot u' = 500(q^3 + 10)^{-\frac{1}{2}} \cdot 3q^2 = \frac{1500q^2}{\sqrt{q^3 + 10}}$$

$$TK'(35) = 8873 \text{ euro}$$

b. $W = R - TK = -700(q^2 - 30q + 70) - 1000\sqrt{q^3 + 10}$

$$W' = -700(2q - 30) - \frac{1500q^2}{\sqrt{q^3 + 10}} = 0$$

$$\text{neem } y_1 = -700(2x - 30) - \frac{1500x^2}{\sqrt{x^3 + 10}}$$

de optie zero geeft $x = 11,4$ dus $q = 11,4$

Opgave 63:

$$p = \sqrt{12500 - 25q} = \sqrt{u} = u^{\frac{1}{2}} \text{ met } u = 12500 - 25q \text{ dus } u' = -25$$

$$p' = \frac{1}{2}u^{-\frac{1}{2}} \cdot u' = \frac{1}{2}(12500 - 25q)^{-\frac{1}{2}} \cdot -25 = -\frac{12,5}{\sqrt{12500 - 25q}}$$

$$p'(250) = -0,16 \text{ euro per stuk}$$