

Opmerkingen: Zie §2.7, blz. 41 t/m 48

Antwoorden 2.47-1:

a. $q_x = (1 \text{ kN/m}^2)x + (3 \text{ kN/m})$

b. $N = -(0,5 \text{ kN/m}^2)x^2 - (3 \text{ kN/m})x + (6 \text{ kN})$

$$u = -\frac{x^3}{54 \times 10^3 \text{ m}^2} - \frac{x^2}{6 \times 10^3 \text{ m}} + \frac{2x}{3 \times 10^3} + \frac{6 \text{ m}}{1 \times 10^3}$$

c. $N(x=0) = +6 \text{ kN}$; $N(x=6 \text{ m}) = -30 \text{ kN}$

$$u(x=0) = +6 \text{ mm}; u(x=6 \text{ m}) = 0$$

d. $N_A = -30 \text{ kN} \Rightarrow A_v = 30 \text{ kN} \uparrow$

e. $u_B = 6 \text{ mm} \downarrow$

Toelichting:

Eenheden waarin wordt gewerkt: kN en m

$$q_x = x + 3$$

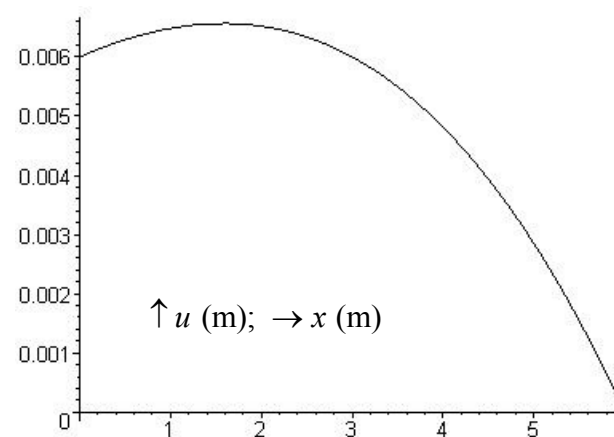
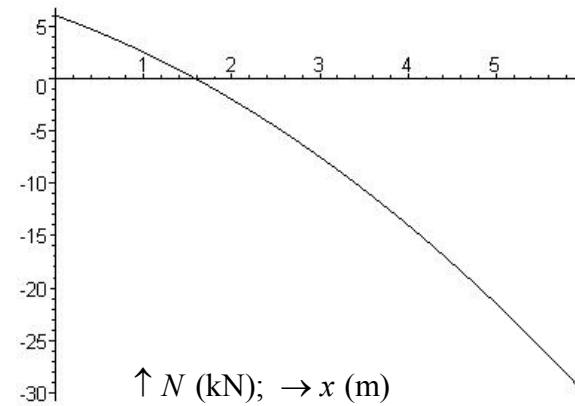
$$EAu'' = -q_x = -x - 3$$

$$N = EAu' = -\frac{1}{2}x^2 - 3x + C_1$$

$$EAu = -\frac{1}{6}x^3 - \frac{3}{2}x^2 + C_1x + C_2$$

$$x=0; N = +6 \text{ kN} \Rightarrow C_1 = 6 \text{ kN}$$

$$x=6 \text{ m}; u=0 \Rightarrow C_2 = 54 \text{ kNm}$$



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Antwoorden 2.47-2:

a. $q_x = -(1 \text{ kN/m}^2)x + (9 \text{ kN/m})$

b. $N = +(0,5 \text{ kN/m}^2)x^2 - (9 \text{ kN/m})x + (6 \text{ kN})$

$$u = +\frac{x^3}{54 \times 10^3 \text{ m}^2} - \frac{x^2}{2 \times 10^3 \text{ m}} + \frac{2x}{3 \times 10^3} + \frac{10 \text{ m}}{1 \times 10^3}$$

c. $N(x=0) = +6 \text{ kN}$; $N(x=6 \text{ m}) = -30 \text{ kN}$

$$u(x=0) = +10 \text{ mm}; u(x=6 \text{ m}) = 0$$

d. $N_A = -30 \text{ kN} \Rightarrow A_v = 30 \text{ kN} \uparrow$

e. $u_B = 10 \text{ mm} \downarrow$

Toelichting:

Eenheden waarin wordt gewerkt: kN en m

$$q_x = -x + 9$$

$$EAu'' = -q_x = +x - 9$$

$$N = EAu' = +\frac{1}{2}x^2 - 9x + C_1$$

$$EAu = +\frac{1}{6}x^3 - \frac{9}{2}x^2 + C_1x + C_2$$

$$x=0; N = +6 \text{ kN} \Rightarrow C_1 = 6 \text{ kN}$$

$$x=6 \text{ m}; u=0 \Rightarrow C_2 = 90 \text{ kNm}$$

