Gemengde opgaven hoofdstuk 2: Functies en grafieken.

Opgave 14:

a. $5x^2 - 6x = 0$
$x(5x - 6) = 0$
$x = 0 \quad \vee \quad 5x = 6$
$x = 0 \quad \vee \quad x = 1{,}2$

b. $5x^2 - 6x = 8$
$5x^2 - 6x - 8 = 0$
$x = \dfrac{6 \pm \sqrt{36 + 160}}{10} = \dfrac{6 \pm \sqrt{196}}{10} = \dfrac{6 \pm 14}{10}$
$x = \dfrac{6 + 14}{10} = 2 \quad \vee \quad x = \dfrac{6 - 14}{10} = -0{,}8$

c. $5x^2 - 6x = 4x$
$5x^2 - 10x = 0$
$5x(x - 2) = 0$
$x = 0 \quad \vee \quad x = 2$

d. $3x^2 + 5 = 9$
$3x^2 = 4$
$x^2 = \frac{4}{3}$
$x = \sqrt{\frac{4}{3}} = 1{,}15 \quad \vee \quad x = -\sqrt{\frac{4}{3}} = -1{,}15$

e. $x^2 + 3(x - 6) = 3x$
$x^2 + 3x - 18 = 3x$
$x^2 = 18$
$x = \sqrt{18} = 4{,}24 \quad \vee \quad x = -\sqrt{18} = -4{,}24$

f. $(2x - 3)(5x - 9) = 0$
$2x = 3 \quad \vee \quad 5x = 9$
$x = 1{,}5 \quad \vee \quad x = 1{,}8$

g. $8x + 3 = 10(6x - 2)$
$8x + 3 = 60x - 20$
$-52x = -23$
$x = 0{,}44$

h. $(3x + 2)(x - 1) = 2$
$3x^2 - 3x + 2x - 2 = 2$
$3x^2 - x - 4 = 0$
$x = \dfrac{1 \pm \sqrt{1 + 48}}{6} = \dfrac{1 \pm \sqrt{49}}{6} = \dfrac{1 \pm 7}{6}$
$x = \dfrac{1 + 7}{6} = \frac{4}{3} \quad \vee \quad x = \dfrac{1 - 7}{6} = -1$

i. $(x + 2)^2 = 25$
$x + 2 = 5 \quad \vee \quad x + 2 = -5$
$x = 3 \quad \vee \quad x = -7$

j. $8+(2x-1)^2=11x$

$8+4x^2-4x+1=11x$

$4x^2-15x+9=0$

$x=\dfrac{15\pm\sqrt{225-144}}{8}=\dfrac{15\pm\sqrt{81}}{8}=\dfrac{15\pm9}{8}$

$x=\dfrac{15+9}{8}=3 \quad \vee \quad x=\dfrac{15-9}{8}=0{,}75$

Opgave 15:

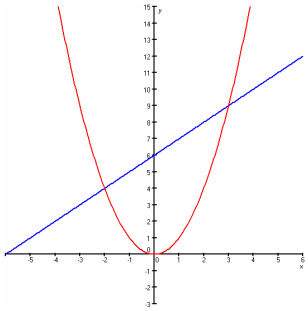
a. $y_1=x^2$

$y_2=x+6$

intersect geeft:

$x=-2 \quad \vee \quad x=3$

$x\le -2 \quad \vee \quad x\ge 3$

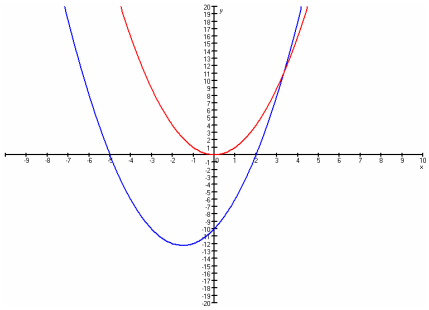


b. $y_1=x^2$

$y_2=(x-2)(x+5)$

intersect geeft: $x=3{,}33$

$x<3{,}33$

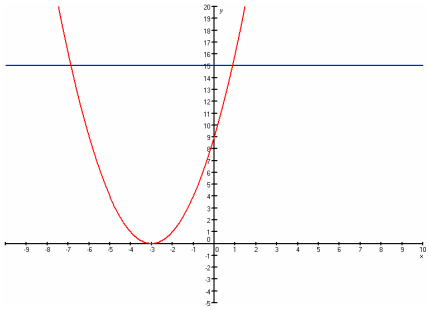


c. $y_1=(x+3)^2$

$y_2=15$

intersect geeft: $x=-6{,}87 \quad \vee \quad x=0{,}87$

$-6{,}87\le x\le 0{,}87$

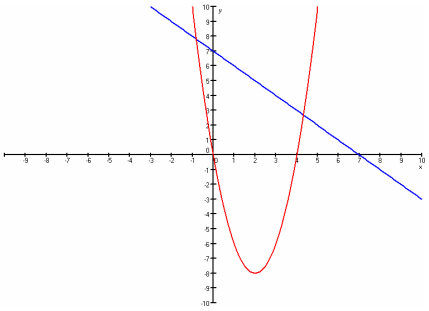


d. $y_1=2x^2-8x$

$y_2=-x+7$

intersect geeft: $x=-0{,}81 \quad \vee \quad x=4{,}31$

$-0{,}81<x<4{,}31$



Opgave 16:

a. $rc_m=rc_k=-0{,}5$

$y=-0{,}5x+b$ door $(-4,3)$

$3=2+b$

$b=1$

m: $y = -0{,}5x + 1$

b. snijpunt x-as: $y = 0$

$-0{,}5x + 16 = 0$

$-0{,}5x = -16$

$x = 32$ dus $B\,(32{,}0)$

$rc_m = rc_l = 2$

$y = 2x + b$ door $(32{,}0)$

$0 = 64 + b$

$b = -64$

n: $y = 2x - 64$

snijpunt y-as: $(0{,}-64)$

c. $-0{,}5x + 16 = 2x - 9$

$-2{,}5x = -25$

$x = 10$

$y = -0{,}5 \cdot 10 + 16 = 11$ dus $C\,(10{,}11)$

d. $2x - 9 = -24$

$2x = -15$

$x = -7{,}5$

Opgave 17:

a. als $g = 2355$ dan $B = 735{,}94$

als $g = 2906$ dan $B = 890{,}22$

$$rc = \frac{\Delta B}{\Delta g} = \frac{890{,}22 - 735{,}94}{2906 - 2355} = 0{,}28$$

$B = 0{,}28g + b$ door $(2355; 735{,}94)$

$735{,}94 = 659{,}4 + b$

$b = 76{,}54$

$B = 0{,}28g + 76{,}54$

b. vastrecht € 76,54

prijs per m³ gas € 0,28

c. $B = 0{,}28 \cdot 2318 + 76{,}54 = 725{,}58$ euro

Opgave 18:

a. als $p = 4$ dan $q = 100$

als $p = 3{,}94$ dan $q = 105$

$$rc = \frac{\Delta p}{\Delta q} = \frac{3{,}94 - 4}{105 - 100} = -0{,}012$$

$p = -0{,}012q + b$ door $(100{,}4)$

$4 = -1{,}2 + b$

$b = 5{,}2$

$p = -0{,}012q + 5{,}2$

b. $K = 2{,}5q$

$R = p \cdot q = (-0{,}012q + 5{,}2) \cdot q = -0{,}012q^2 + 5{,}2q$

$W = R - K = -0{,}012q^2 + 5{,}2q - 2{,}5q = -0{,}012q^2 + 2{,}7q$

c. de optie maximum geeft: $x = 112{,}5$
dus $q = 112 \quad \vee \quad q = 113$
dan $p = 3{,}85$ en $W_{\max} = 151{,}87$

Opgave 19:

a. de optie maximum geeft $x = 3$ en $y = 2$ dus max $f(3) = 2$

b. $C\ (0;-2{,}5)$
$T\ (3,2)$
$rc = \dfrac{\Delta y}{\Delta x} = \dfrac{2 - -2{,}5}{3 - 0} = 1{,}5$
$y = 1{,}5x + b$ door $(0;-2{,}5)$
$-2{,}5 = b$
$y = 1{,}5x - 2{,}5$

c. de optie zero geeft $x = 5$ dus $B\ (5,0)$
$rc = \dfrac{\Delta y}{\Delta x} = \dfrac{0 - -2{,}5}{5 - 0} = 0{,}5$
$y = 0{,}5x + b$ door $(3,2)$
$2 = 1{,}5 + b$
$b = 0{,}5$
$y = 0{,}5x + 0{,}5$
snijpunt x-as: $y = 0$
$0{,}5x + 0{,}5 = 0$
$0{,}5x = -0{,}5$
$x = -1$ dus $D\ (-1,0)$

Opgave 20:

a. de optie maximum geeft $x = -3$ en $y = 5$ dus max $g(-3) = 5$

b. $-0{,}5x + 3 = -x^2 - 6x - 4$
$x^2 + 5{,}5x + 7 = 0$
$x = \dfrac{-5{,}5 \pm \sqrt{30{,}25 - 28}}{2} = \dfrac{-5{,}5 \pm \sqrt{2{,}25}}{2} = \dfrac{-5{,}5 \pm 1{,}5}{2}$
$x = \dfrac{-5{,}5 - 1{,}5}{2} = -3{,}5 \quad \vee \quad x = \dfrac{-5{,}5 + 1{,}5}{2} = -2$
$y = -0{,}5 \cdot -3{,}5 + 3 = 4{,}75 \qquad y = -0{,}5 \cdot -2 + 3 = 4$
dus $(-3{,}5;4{,}75)$ en $(-2,4)$

c. $f(2) = 2$ en $g(2) = -20$
dus $AB = 2 - -20 = 22$

Opgave 21:

a. als $p = 1{,}80$ dan $q = 1000$
als $p = 1{,}70$ dan $q = 1100$
$rc = \dfrac{\Delta p}{\Delta q} = \dfrac{1{,}70 - 1{,}80}{1100 - 1000} = -0{,}001$
$p = -0{,}001q + b$ door $(1000;1{,}8)$

$1{,}8 = -1 + b$

$b = 2{,}8$

$p = -0{,}001q + 2{,}8$

$R = p \cdot q = (-0{,}001q + 2{,}8) \cdot q = -0{,}001q^2 + 2{,}8q$

$W = R - K = -0{,}001q^2 + 2{,}8q - 1{,}2q = -0{,}001q^2 + 1{,}6q$

b. $y_1 = -0{,}001x^2 + 2{,}8x$ de optie maximum geeft $x = 1400$

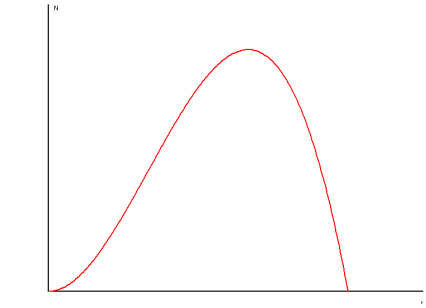
dus $q = 1400$ en dan $p = -0{,}001 \cdot 1400 + 2{,}8 = 1{,}4$

c. $y_1 = -0{,}001x^2 + 1{,}6x$ de optie maximum geeft $x = 800$

dus $q = 800$ en dan is $p = -0{,}001 \cdot 800 + 2{,}8 = 2$ en $W_{max} = 640$

Opgave 22:

a.



b. $y_1 = 4x^2 - 0{,}25x^3$

de optie maximum geeft $x = 10{,}67$ en $y = 152$

dus $t = 10{,}67$ weken $= 75$ dagen

$N_{max} = 152$

c. de optie zero geeft $x = 16$ dus na 16 weken

d. $y_2 = 100$

intersect geeft $x = 6{,}48 \quad \vee \quad x = 13{,}94$

$13{,}94 - 6{,}48 = 7{,}46$ weken $= 52$ dagen