higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT (BEROEPSGERIG)

WISKUNDE
(Eerste vraestel)
NKR VLAK 3

XX Februarie 2020

Hierdie nasienriglyn bestaan uit 9 bladsye.

Kopiereg voorbehou

VRAAG 1

1.1 1.1.1
$(-1+2i)\{(1-5i)+(3+4i)\}$
$=(-1+2i)(4-i)$ ✓
$=-4+i+8i-2i^2$ ✓ (Dra fout van die vorige reël af oor.)
$=-4+9i+2$
$=-2+9i$ ✓ (3)

1.1.2
$\frac{1}{(2+3i)}\times\frac{1}{(1-2i)}$
$=\frac{1}{2-4i+3i-6i^2}$ ✓
$=\frac{1}{8-i}\times\frac{8+i}{8+i}$ ✓ (Dra verkeerde noemer oor.)
$=\frac{8+i}{65}$ ✓
$=\frac{8}{65}+\frac{1}{65}i$ ✓
$=0{,}123+0{,}015i$ (4)

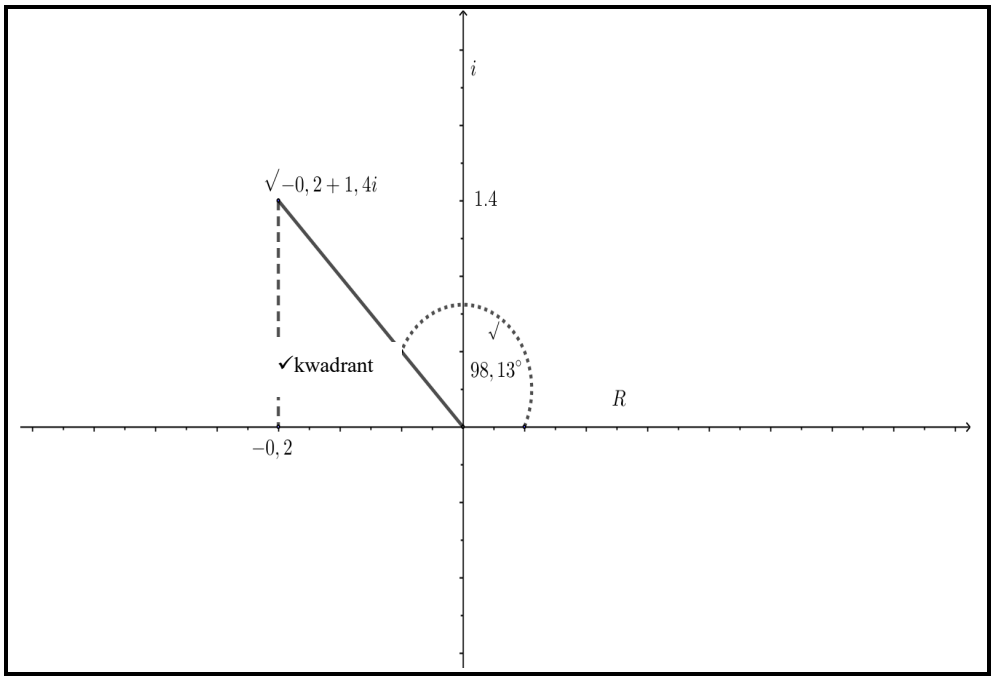
1.1.3
$12(cos45°+isin45°)\times 20(cos120°+isin120°)$
$=240$ ✓ $(cos165°+isin\,165°)$ ✓ (2)

1.1.4
$(2+5i)2+5(7+2i)-i(4-6i)$
$=4+10i+35+10i-4i+6i^2$ ✓
$=33+16i$ ✓ (Dra fout van die vorige reël af oor.) (2)

1.2 1.2.1
$\frac{5+5i}{3-4i}\times\frac{3+4i}{3+4i}$ ✓
$=\frac{15+20i+15i+20i^2}{9-16i^2}$ ✓
$=\frac{-5+35i}{25}$ ✓
$=-\frac{1}{5}+\frac{7}{5}i$
$=-0{,}2+1{,}4i$ ✓ (4)

1.2.2
$-0{,}2+1{,}4i$
$r=\sqrt{(-0{,}2)^2+(1{,}4)^2}$ ✓(Dra fout van 1.2.1 af oor.)
$r=\sqrt{2}$ ✓ $=1{,}414$
$\theta=tan^{-1}\left(\frac{1{,}4}{0{,}2}\right)$
$ref=81{,}87°$ ✓
$\theta=180°-81{,}87°$
$\theta=98{,}13°$ ✓ (4)

1.2.3



(3)

1.3
$$\frac{(3\angle 150°}{(2\angle 30°)(0{,}5\angle 10°)}$$
$$= \frac{3\angle 150°}{1\angle 40°} \checkmark$$
$$= 3\angle 110° \checkmark$$
$$= -1{,}026 + 2{,}819i \checkmark$$ (3)

1.4
$$5x^2 + 2x + 10 = 0$$
$$x = \frac{-(2) \pm \sqrt{(2)^2 - 4(5)(10)}}{2(5)} \checkmark$$
$$= \frac{-2 \pm \sqrt{-196}}{10} \checkmark$$
$$= \frac{-2 \pm \sqrt{196}i}{10} \checkmark$$
$$= \frac{-2}{10} + \frac{14}{10}i \checkmark \; of \; \frac{-2}{10} - \frac{14}{10}i \checkmark$$
$$= -0{,}2 + 1{,}4i \;\; of \; -0{,}2 - 1{,}4i$$ (5)

[30]

VRAAG 2

2.1 $4x^2 - 3 = 2x$

$x^2 - \frac{1}{2}x = \frac{3}{4}$✓

$x^2 - \frac{1}{2}x + (\frac{1}{4})^2 = \frac{3}{4} + (\frac{1}{4})^2$ ✓

$(x - \frac{1}{4})^2 = \frac{13}{16}$

$x = \frac{1}{4} \pm \sqrt{\frac{13}{16}}$ ✓

$x = \frac{1+\sqrt{13}}{4} of \ \frac{1-\sqrt{13}}{4}$

x = 1,151 of $-0,651$✓(Aanvaar 1,152 of –0,652.) (4)

2.2 $2z^2 = 7z - 6$

$2z^2 - 7z + 6 = 0$

$z = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(6)}}{2(2)}$✓

$z = \frac{7 \pm \sqrt{49-48}}{4}$

$z = \frac{7 \pm 1}{4}$✓

$z = 2$ ✓ of $z = \frac{3}{2}$✓ of 1,5 (4)

2.3 $3x^2 - 8x - 4 > 8$

$3x^2 - 8x + 4 > 0$

$(3x - 2)(x - 2) > 0$ ✓✓

$\therefore x < \frac{2}{3}$✓ of $x > 2$✓ (4)

2.4 2.4.1 $\frac{28x-14}{45x-30} \div \frac{14x+7}{30x-20}$

$= \frac{14(2x-1)}{15\cancel{(3x-2)}}$ ✓ $\times \frac{10\cancel{(3x-2)}}{7(2x+1)}$✓

$= \frac{140(2x-1)}{105(2x+1)}$ ✓

$= \frac{4(2x-1)}{3(2x+1)}$ ✓ (4)

2.4.2
$$\frac{x-2}{x}-\frac{x}{x-4}$$
$$=\frac{(x-2)(x-4)-x^2}{x(x-4)} \quad \checkmark \checkmark$$
$$=\frac{x^2-6x+8-x^2}{x(x-4)} \quad \checkmark$$
$$=\frac{-6x+8}{x(x-4)} \checkmark$$
$$=\frac{-2(3x-4)}{x(x-4)}$$
(4)
[20]

VRAAG 3

3.1 3.1.1
$$r(x)=x^2\sqrt[3]{x^2}$$
$$r=x^2x^{\frac{2}{3}} \checkmark$$
$$r=x^{\frac{8}{3}} \checkmark$$
$$r'=\frac{8}{3}x^{\frac{5}{3}}$$
$$r'=\frac{8\sqrt[3]{x^5}}{3} \checkmark$$
(3)

3.1.2
$$y=\frac{-x^3}{3}+\frac{x^2}{2}+x-6$$
$$y'=-x^2\checkmark+x\checkmark+1\checkmark+0\checkmark$$
(4)

3.1.3
$$f(x)=(3x)^{-4}$$
$$f(x)=3^{-4}x^{-4}$$
$$f(x)=\frac{1}{81}x^{-4}\checkmark$$
$$f'=\frac{-4}{81x^5}\checkmark$$
(2)

3.2 $y = \frac{1}{x}$

$f(x+h) = \frac{1}{(x+h)}$

$f' = \lim_{h\to 0} \frac{\frac{1}{(x+h)} - \frac{1}{x}}{h}$ ✓

$f' = \lim_{h\to 0} \frac{\frac{x-x-h}{x(x+h)}}{h}$ ✓

$f' = \lim_{h\to 0} \frac{-h}{x(x+h)} . \frac{1}{h}$

$f' = \lim_{h\to 0} \frac{-1}{x(x+h)}$ ✓

$f' = -\frac{1}{x^2}$ ✓ (4)

3.3 $\lim_{x\to\infty} \frac{-4x}{7x-3}$

$= \lim_{x\to\infty} \frac{\frac{-4x}{x}}{\frac{7x}{x} - \frac{3}{x}}$ ✓

$= \lim_{x\to\infty} \frac{-4}{7 - \frac{3}{x}}$

$= \frac{-4}{7-0}$ ✓

$= \frac{-4}{7}$ ✓ (3)

3.4 Laat een getal x wees ∴ *die ander getal* $x - 4$ wees

$P = x(x-4)$ ✓

$P = x^2 - 4x$

$P' = 2x - 4$ ✓

$P' = 0$

$2x - 4 = 0$

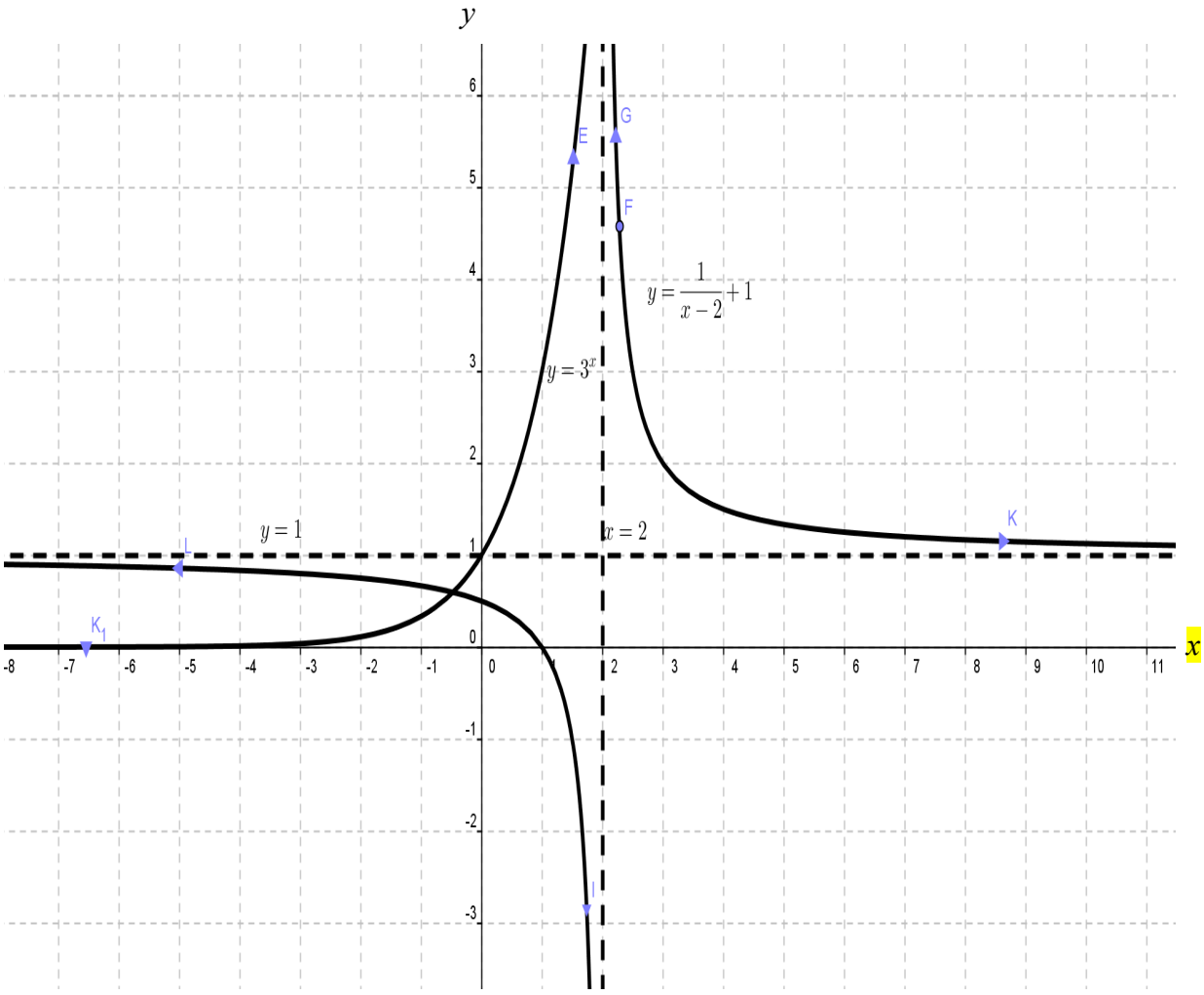
$x = 2$ ✓

Die ander getal is $2 - 4 = -2.$ ✓ (4)

[20]

VRAAG 4

4.1



TWEE punte vir die korrekte tekening van $y = 3^x$

- ✓ vir die x-afsnit
- ✓ omdat daar nie aan die x-as geraak is nie asook vir die vorm

VIER punte vir die korrekte tekening van $y = \frac{1}{x-2}+1$

- ✓ vir die korrekte x-asimptoot
- ✓ vir die korrekte y-asimptoot
- ✓ vir die korrekte x-afsnit
- ✓ vir die korrekte vorm (6)

4.2 4.2.1

$y = ax^2 + bx + c; c = 0$
$4{,}5 = a(-3)^2 + b(-3)\ [-3; 4{,}5]$
$4{,}5 = 9a - 3b\ (\times 2)$
$2 = a(2)^2 + b(2)\ \ [2; 2]$
$\underline{2 = 4a + 2b\ (\times 3)}$ ✓
$9 = 18a - 6b\ vergelyking\ 1$
$\underline{6 = 12a + 6b\ vergelyking\ 2}$
$15 = 30a$
$a = \frac{1}{2}$ ✓
$Substitueer: 2 = 4\left(\frac{1}{2}\right) + 2b$
$2 = 2 + 2b$
$0 = 2b$
$b = 0$ ✓
$\therefore y = \frac{1}{2}x^2$ ✓

Alternatiewe metode

Vergelyking van 'n parabool
$y = a(x-p)^2 + q$ ✓
Substitueer
$y = a(x-0)^2 + 0$ ✓
$y = ax^2$
Substitueer 'n punt (2;2)
$2 = a(2)^2$
$a = \frac{1}{2}$ ✓
$\therefore y = \frac{1}{2}x^2$ ✓

(4)

4.2.2

$y = mx + c$
$m = \frac{(4{,}5 - 2)}{(-3 - 2)}$ ✓
$m = -\frac{1}{2}$ ✓
$c = 3\ op\ grafiek$✓
$\therefore y = -\frac{1}{2}x + 3$ ✓

(4)

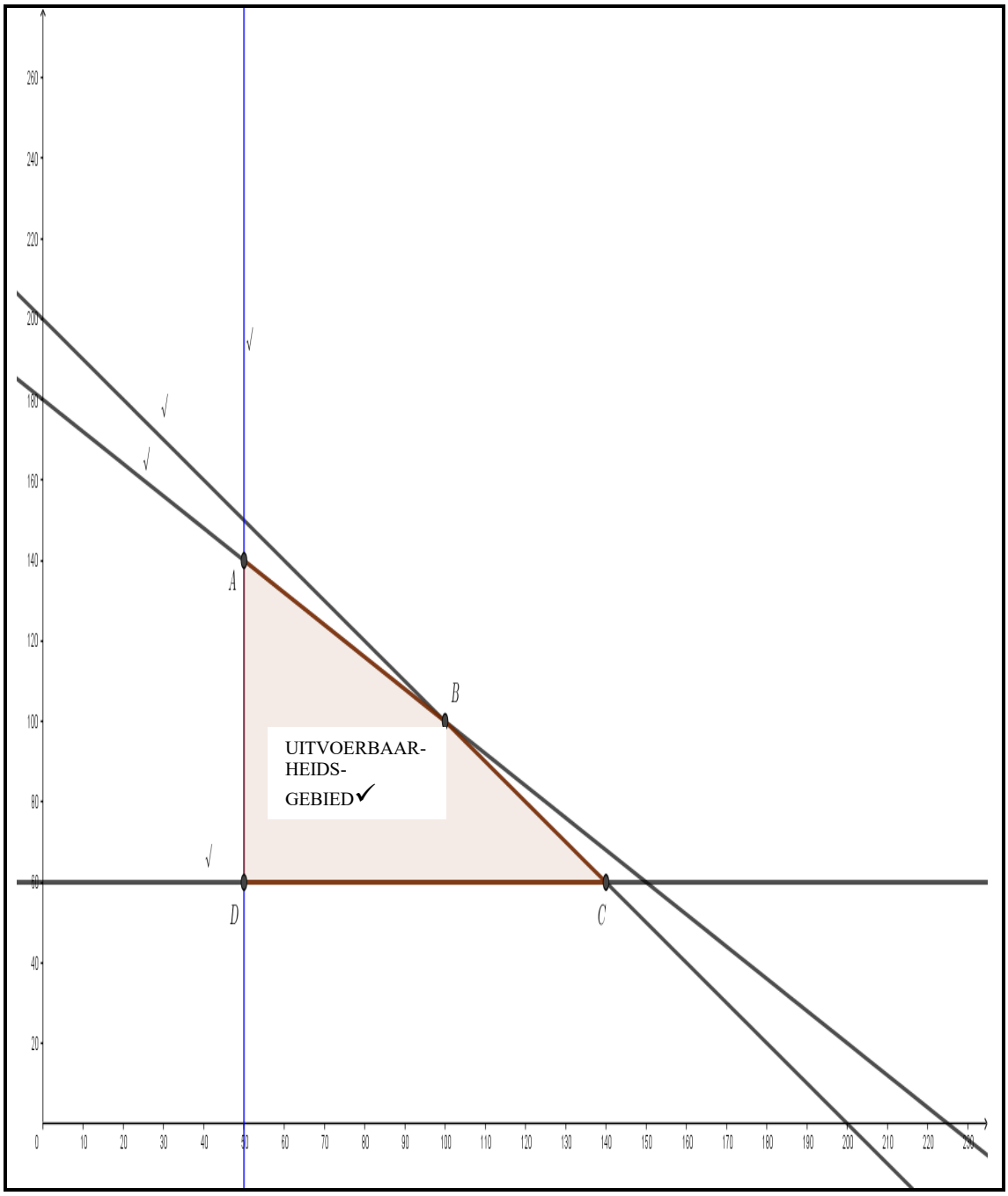
4.2.3 Kontinu (1)

4.2.4 'n Funksie (1)

4.2.5 Definisiegebied: $g(x): \{x: x \epsilon R\}$ (2)

4.2.6 Waardegebied van $f(x) = \{y: y \geq 0; y \epsilon R\}$ (2)

4.3 4.3.1



(4)

4.3.2 Sien grafiek. (1)

4.3.3 $A(50;140) \therefore P = 0{,}3(50) + 0{,}5(140) = 85$✓
$B(100;100) \therefore P = 0{,}3(100) + 0{,}5(100) = 80$✓
$C(140;60) \therefore P = 0{,}3(140) + 0{,}5(60) = 72$✓
$D(50;60) \therefore P = 0{,}3(50) + 0{,}5(60) = 45$✓
$D(50;60)$ *sal die wins minimaliseer.*✓ (5)

[30]

TOTAAL: 100

Kopiereg voorbehou