ALPHA WISKUNDE

WAT VERANDER IN 2023?

GRAAD 12, 2023

- 15 Multikeuse vrae
- Formuleblad

VEKTORE

$\|\boldsymbol{AB}\| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$	$\boldsymbol{u} \times \boldsymbol{v} = \begin{vmatrix} \boldsymbol{i} & \boldsymbol{j} & \boldsymbol{k} \\ u_1 & u_2 & u_3 \\ v_1 & v_2 & v_3 \end{vmatrix}$

$\|\boldsymbol{OP}\| = \sqrt{a^2 + b^2 + c^2}$	$\boldsymbol{u} \bullet \boldsymbol{v} = \|\boldsymbol{u}\|\|\boldsymbol{v}\| \cos\theta$	$\boldsymbol{u} \bullet \boldsymbol{v} = x_1.x_2 + y_1.y_2 + z_1.z_2$	$\alpha = \begin{matrix}\text{bgcos} \\ \text{arccos}\end{matrix}\left(\frac{u_n}{\|\boldsymbol{u}\|}\right)$

$\arctan x$	$x^2 + 1$
a^x	$a^x.\ln a$
$\log_a x$	$\frac{1}{x.\ln a}$
e^x	e^x
$\ln\|x\|$	$\frac{1}{x}$

WORTELS VAN KOMPLEKSE GETALLE

GAUSS

Het bewys dat

$$x^n + \cdots = 0$$

n antwoorde het.

$$x^3 = 1$$

Moet 3 antwoorde hê

OF

$\sqrt[3]{1}$ is drie getalle

GEWONE ALGEBRA

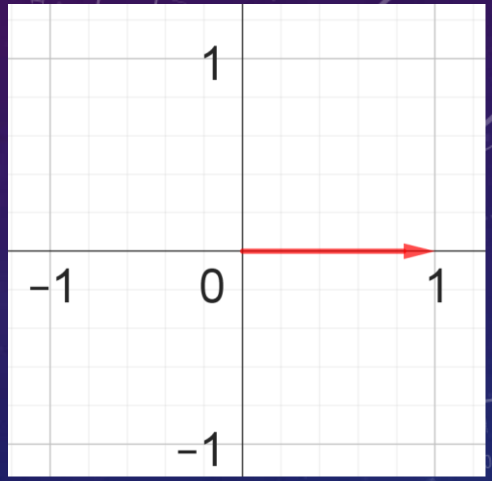
$$x^3 - 1 = 0$$

$$(x-1)\left(x^2+x+1\right) = 0$$

$$x = 1 \text{ of } x = \frac{-1 \pm \sqrt{1^2 - 4(1)(1)}}{2(1)}$$

$$x = 1 \text{ of } x = -\frac{1}{2} \pm \frac{\sqrt{3}i}{2}$$

KOMPLEKSE GETALLE EN DE MOIVRE



$$z^3 = 1 + 0i$$

Skryf 1 in poolvorm: $1cis(0)$

Tel by hoek 2π by, dit bly dieselfde antwoord

Gaan dit 2 keer doen

Dan is $z = 1cis(0) = 1cis(2\pi) = 1cis(4\pi)$

KRY NOU DERDE MAGS WORTEL

$$\mathbf{z = 1cis(0) = 1cis(2\pi) = 1cis(4\pi)}$$

Kry derdemagswortel van r en deel die hoek met 3.

Die derdemagswortel van 1 is gelyk aan 1.

$$\sqrt[3]{z} = \sqrt[3]{1} = 1cis\left(\frac{0}{3}\right) = 1cis\left(\frac{2\pi}{3}\right) = 1cis(\frac{4\pi}{3})$$

SKAKEL TERUG NA REGHOEKVORM

$$\sqrt[3]{1} = z^{\frac{1}{3}} = 1cis\left(\frac{0}{3}\right) = 1cis\left(\frac{2\pi}{3}\right) = 1cis(\frac{4\pi}{3})$$

$\sqrt[3]{1} = 1$

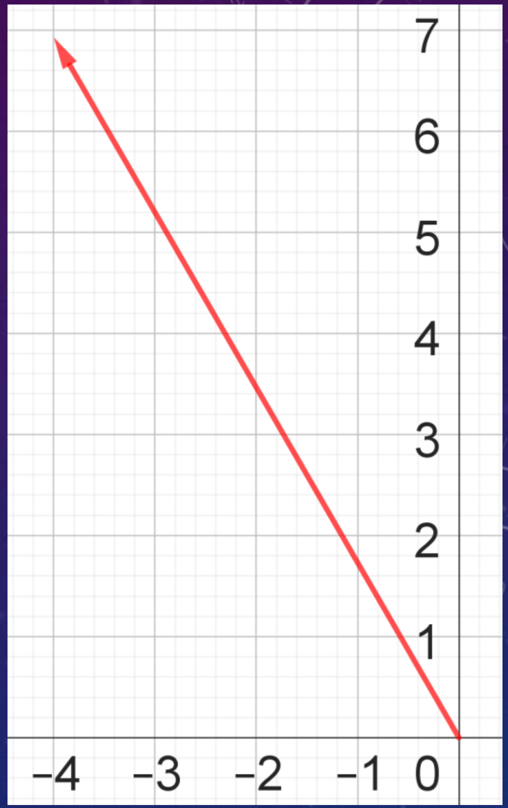
of $\sqrt[3]{1} = -\frac{1}{2} + \frac{\sqrt{3}i}{2}$

of $\sqrt[3]{1} = -\frac{1}{2} - \frac{\sqrt{3}i}{2}$

"RESEP"

- Skryf die getal in poolvorm indien dit nie is nie.
- Tel $2\pi\ n-1$ keer by die hoek by, skryf die getalle neer.
- Kry die n'de mags wortel van r en deel al die hoeke net n.
- Dit is die n antwoorde. Indien gevra, skakel om na reghoevorm.

AS $z^3 = -4 + 4\sqrt{3}i$, BEPAAL z.



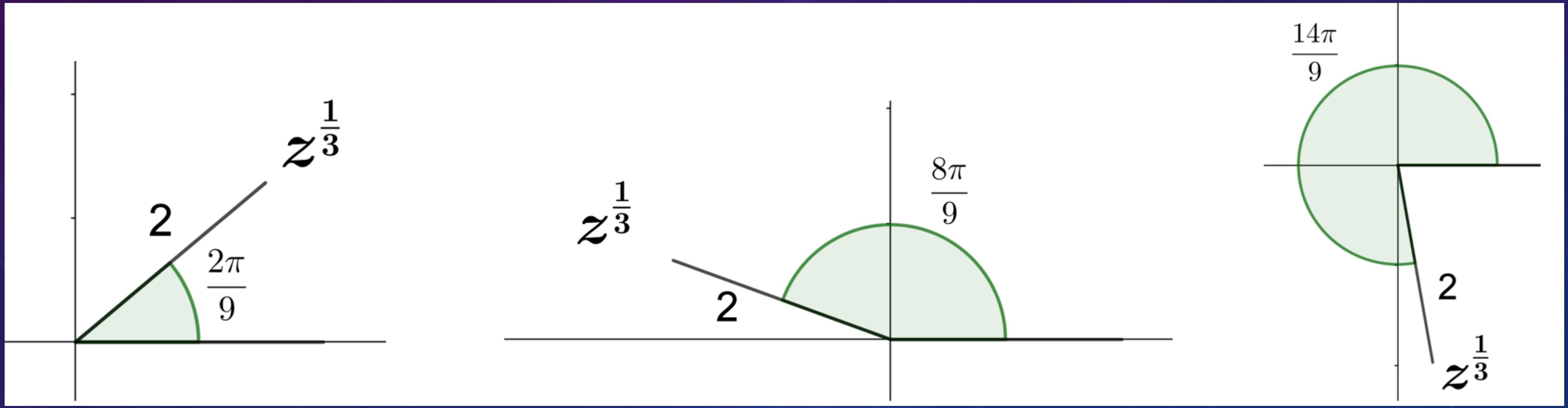
$$z^3 = 8cis(\frac{2\pi}{3})$$

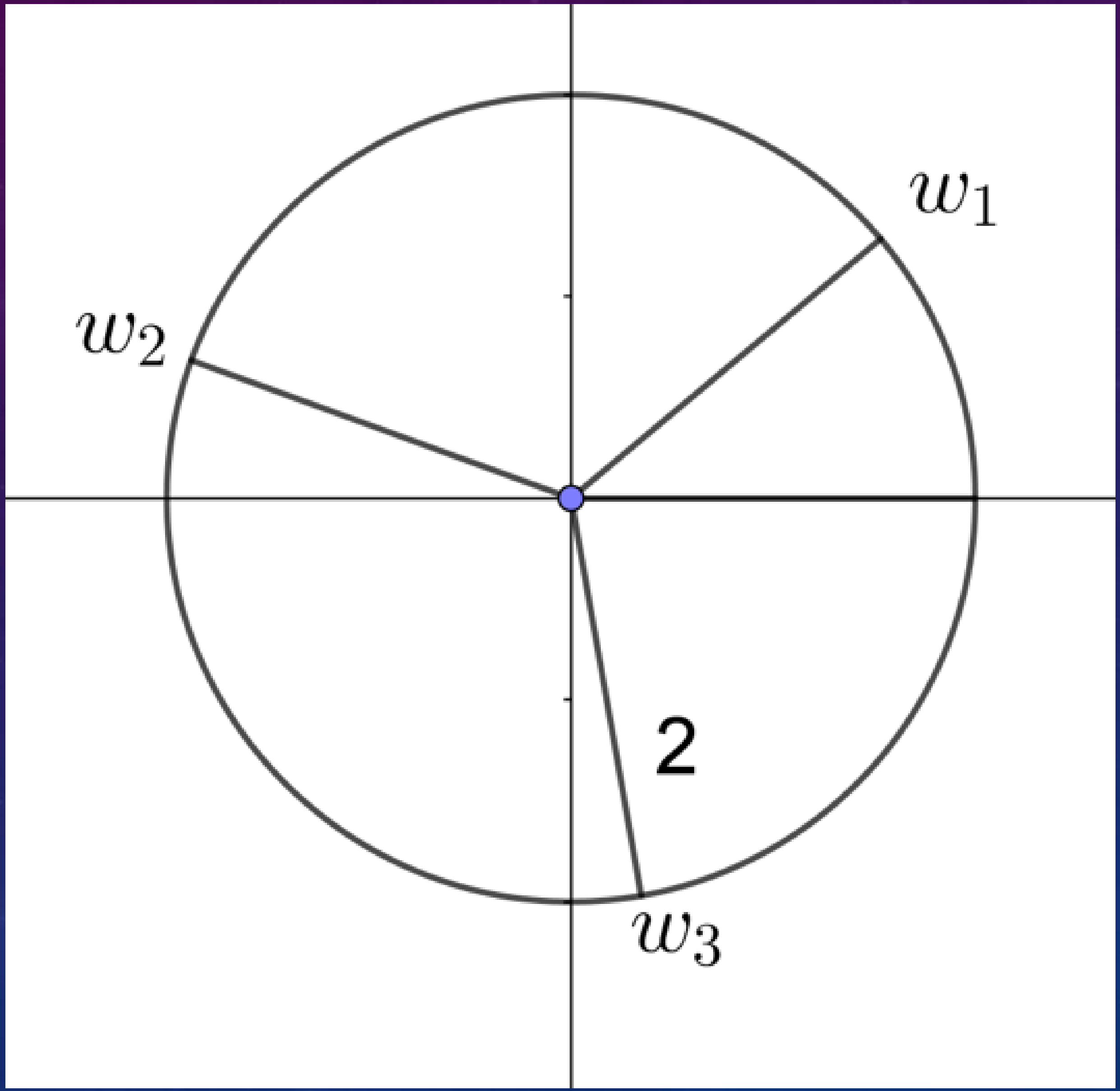
Dus $z^3 = 8cis(\frac{2\pi}{3}) = 8cis(\frac{8\pi}{3}) = 8cis(\frac{14\pi}{3})$

Kry $\sqrt[3]{8}$ en deel die hoek met 3:

Dan is $z = 2cis(\frac{2\pi}{9}) = 2cis(\frac{8\pi}{9}) = 2cis(\frac{14\pi}{9})$

$$2cis\left(\frac{2\pi}{9}\right) = 2cis\left(\frac{8\pi}{9}\right) = 2cis\left(\frac{14\pi}{9}\right)$$





w_1
w_2
2
w_3