1

$1 \quad 1$

$1 \quad 2 \quad 1$

$1 \quad 3 \quad 3 \quad 1$

$1 \quad 4 \quad 6 \quad 4 \quad 1$

0

1

2

3

4

$i = \sqrt{-1}$

$i^7 = i^4 \cdot i^3$

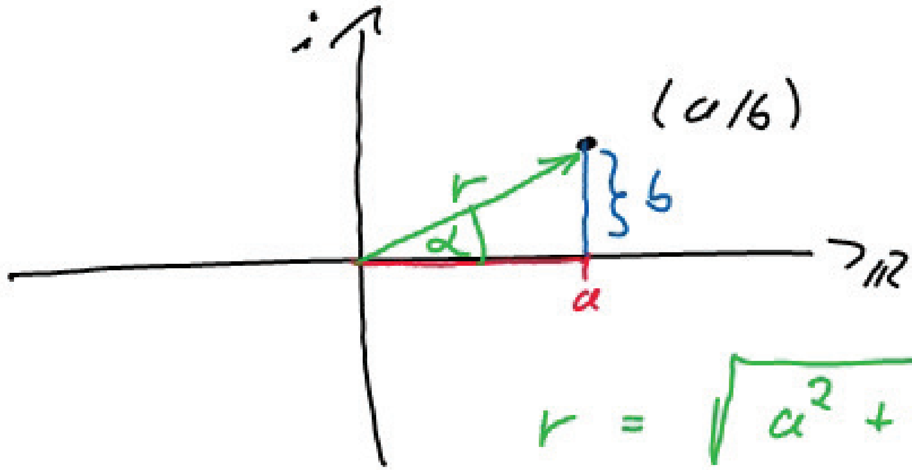
$(2i - 1/2)^4$

$$\underbrace{1(2i)^4\left(-\tfrac{1}{2}\right)^0}_{} + 4(2i)^3\left(-\tfrac{1}{2}\right)^1 + 6(2i)^2\left(-\tfrac{1}{2}\right)^2 + 4(2i)^1\left(-\tfrac{1}{2}\right)^3 + 1(2i)^0\left(-\tfrac{1}{2}\right)^4$$

$$16 + 16i - 6 - i + 1/16$$

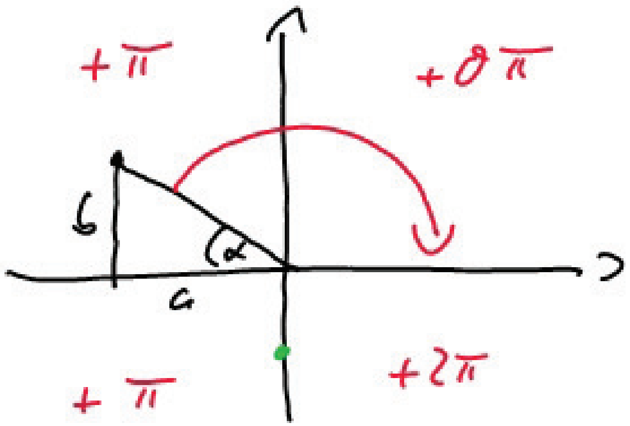
$$15i + 10\,1/16$$

Betrag / Argument



$$r = \sqrt{a^2 + b^2}$$

$$\alpha = \arctan \frac{b}{a}$$



AUFGABEN

Berechnen Sie die folgenden Terme und geben Sie die Lösung als $z = a + bi$ an.

1) $(2i - 5) \cdot [(3i + 4) - 2 \cdot (i - 4)]$

2) $4 \cdot (i - 3) \cdot (3 + 1) - (i - 2) \cdot (5 + i)$

$(-i^5 + 2i^{14})^5$

3) $4i^8 \cdot (4i - 2i^{11}) \cdot [(i^3 + 2i) \cdot (4i + 1)]$

$\frac{(3i-1)^2}{4-3i} - \frac{(2+5i)^2}{1-2i}$

4) $15i^{11} - 3i \cdot (2i^7 + 2i^8) + 6i \cdot (2i - 5i^{15} + 3i^6)$

5) $(i - 4i^{76}) \cdot (3i^{11} - 6i^{14}) \cdot (2i^{13} + 4i^{26})$

6) $(-5i^{32} + 4i^{17}) \cdot (2 + i^{23}) - (4i^{19} + i^{46}) \cdot (3i^{19} + i^{54})$

$$(-i^5 + 2i^{14})^5 = (-i - 2)^5$$

$$1(-i)^5 + 5(-i)^4(-2)^1 + 10(-i)^3(-2)^2 + 10(-i)^2(-2)^3 + 5(-i)^1(-2)^4 + 1(-2)^5$$

$$(-i)^5 = (-1 \cdot i)^5 = (-1)^5 \cdot i^5 = -1 \cdot i = -i$$

$$-i - 10 + 40i + 80 - 80i - 32$$

$$38 - 41i$$

$$r = \sqrt{38^2 + 41^2}$$

$$\alpha : \arctan\left(-\frac{41}{38}\right) + 2\pi$$

1) $z = +19i - 62$ $\qquad r = \sqrt{19^2 + 62^2}$

$\alpha = \arctan -\left(\frac{19}{62}\right) + \pi$

3) $z = -96i - 24$ $\qquad r = \sqrt{96^2 + 24^2}$

$\alpha = \arctan\left(\frac{96}{24}\right) + \pi$

$$\frac{(3i-1)^2}{4-3i} = \frac{-8-6i}{4-3i} \cdot \frac{4+3i}{4+3i} = \frac{-2(4+3i)(4+3i)}{25}$$

$$= \frac{-2\cdot(7+24i)}{25}$$

$$\frac{(2+5i)^2}{1-2i} = \frac{-21+20i}{1-2i} \cdot \frac{1+2i}{1+2i} = \frac{-21+20i-42i-40}{5}$$

$$\frac{-61-22i}{5}\cdot\frac{5}{5}=\frac{-305-110i}{25}$$

$$\frac{-14-48i-(-305-110i)}{25}$$

$$\frac{291}{25}+\frac{62}{25}i$$

$$r=\sqrt{\left(\frac{291}{25}\right)^2+\left(\frac{62}{25}\right)^2}$$

$$\alpha=\arctan\frac{62}{291}+0\pi$$