

$$1) (\underline{2i} - \underline{1/2})^4$$

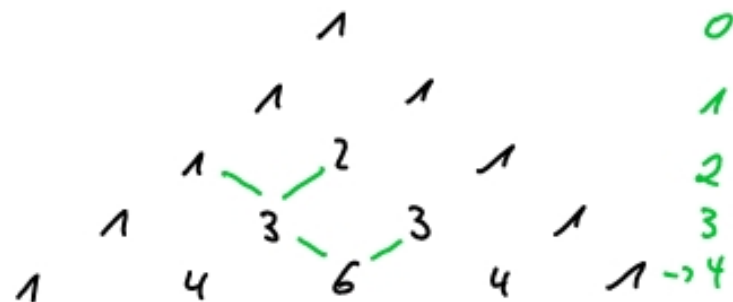
$$2) \frac{5i(3+9i)}{(3i+1)^2} - \frac{(4i-3)^2}{(1-3i)}$$

$$3) z^2 - (6i-4) \cdot z = 12i + 9 \rightarrow \text{Betrag + Argument}$$

$$4) \begin{vmatrix} 2-i & -3 & 0 \\ 1 & i+1 & 2 \\ -i & -1 & i-1 \end{vmatrix}$$

$$5) z = \frac{7}{20} i^3 \cdot [(3-2i^3)^4 - 1]$$

$$1) \begin{aligned} & 1 (2i)^4 (1/2)^0 - 4 (2i)^3 (1/2)^1 + 6 (2i)^2 (1/2)^2 - 4 (2i)^1 (1/2)^3 + 1 (2i)^0 (1/2)^4 \\ & 16 \cdot 1 - 4 \cdot 8(-i)(1/2) + 6 \cdot 4(-1) \cdot 1/4 - 4 \cdot 2i \cdot 1/8 + 1/16 \\ & 16 + 16i - 6 - i + 1/16 \\ & 10 \frac{1}{16} + 15i \end{aligned}$$



$$2) \frac{5i \cdot 3(1+3i)}{(3i+1)^2} - \frac{-16-24i+9}{1-3i} = \frac{15i}{3i+1} - \frac{-24i-7}{1-3i}$$

$$\frac{15i}{3i+1} \cdot \frac{3i-1}{3i-1} = \frac{-45-15i}{-9-1} = \frac{-45-15i}{-10} = \frac{9}{2} + \frac{3}{2}i$$

$$\frac{24i+7}{1-3i} \cdot \frac{1+3i}{1+3i} = \frac{24i+7-7i+21i}{1+9} = \frac{45i-65}{10} = \frac{9}{2}i - \frac{13}{2}$$

$$\left(\frac{9}{2} + \frac{3}{2}i\right) + \left(\frac{9}{2}i - \frac{13}{2}\right) = -2 + 6i$$

$$3) z^2 - \underbrace{(6i-4)}_p \cdot z - \underbrace{(12i+9)}_q = 0$$

$$z_{1/2} = \frac{6i-4}{2} \pm \sqrt{(3i-2)^2 + (12i+9)}$$

$$= 3i-2 \pm \sqrt{\underline{-9} - \underline{12i} + \underline{4} + \underline{12i} + \underline{9}}$$

$$\nearrow \begin{aligned} z_1 &= 3i \\ z_2 &= 3i-4 \end{aligned}$$

$$z_1 = 3i + 0$$

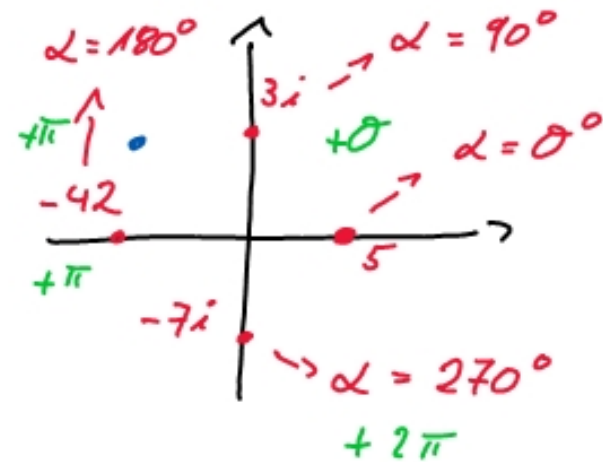
$$r = \sqrt{3^2 + 0^2} = 3$$

$$\alpha = \pi/2 = 90^\circ$$

$$z_2 = \underline{3i - 4}$$

$$r = \sqrt{3^2 + 4^2} = 5$$

$$\alpha = \arctan(-3/4) + \pi$$



$$4) \begin{vmatrix} 2-i & -3 & 0 \\ 1 & i+1 & 2 \\ -i & -1 & i-1 \end{vmatrix} = \begin{vmatrix} (2-i)(i+1)(i-1) + 6i + 0 \\ 0 & -3(i-1) - 2(2-i) \end{vmatrix}$$

$$-4 + 2i + 6i - [-3i + 3 - 4 + 2i] = 9i - 3$$

$$5) 42 + 42i$$