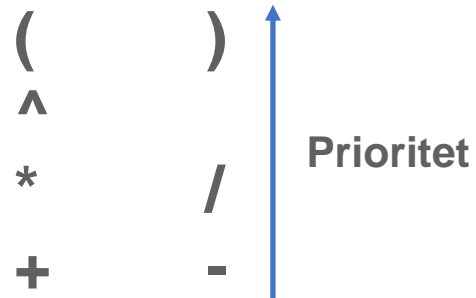


## Tall

Tallmengder

$$N \subset N_0 \subset Z \subset Q \subset R \subset C$$

## Binære operasjoner



Kommutativ lov

Addisjon

$$a + b = b + a$$

Kommutativ lov

Multiplikasjon

$$a * b = b * a$$

Assosiativ lov

$$a + (b + c) = (a + b) + c$$

Distributiv lov

$$a * (b + c) = a * b + a * c$$

## Komplekse tall

Imaginær enhet

$$i = \sqrt{-1}$$

Komplekstall

$$z = x + iy$$

$$z = r(\cos \theta + i \sin \theta)$$

$$z = re^{i\theta}$$

Kompleks konjugering

$$z = x - iy$$

$$z = r(\cos \theta - i \sin \theta)$$

$$z = re^{-i\theta}$$

Addisjon / Subtraksjon

$$z = z_1 \pm z_2 = (x_1 \pm x_2) + i(y_1 \pm y_2)$$

Multiplikasjon

$$z = z_1 \cdot z_2 = r_1 r_2 e^{i(\theta_1 + \theta_2)} = r_1 r_2 [\cos(\theta_1 + \theta_2) + i \sin(\theta_1 + \theta_2)]$$

Divisjon

$$z = \frac{z_1}{z_2} = \frac{r_1}{r_2} e^{i(\theta_1 - \theta_2)} = \frac{r_1}{r_2} [\cos(\theta_1 - \theta_2) + i \sin(\theta_1 - \theta_2)]$$

Potenser

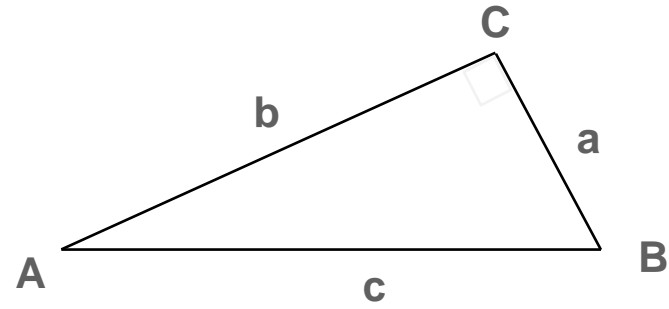
$$z^n = r^n e^{in\theta} = r^n [\cos(n\theta) + i \sin(n\theta)]$$

Røtter

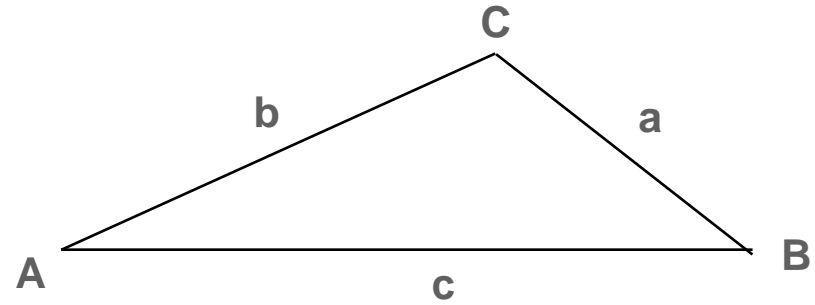
$$z^n = r^n e^{\frac{m}{n} i(\theta + 2k\pi)} = r^n \left[ \cos\left(\frac{m}{n}(\theta + 2k\pi)\right) + i \sin\left(\frac{m}{n}(\theta + 2k\pi)\right) \right] \quad k = 0, 1, 2, \dots, n-1$$

## Pythagoras

$$c^2 = a^2 + b^2$$



$$c^2 = a^2 + b^2 - 2ab \cos C$$



## Kvadratsetninger

1.  $(a + b)^2 = a^2 + 2ab + b^2$

2.  $(a - b)^2 = a^2 - 2ab + b^2$

3.  $(a - b)(a + b) = a^2 - b^2$

## Potenser / Kvadratrøtter

**Definisjon:**

$$a^n = \underbrace{a \cdot a \cdot a \cdot \dots \cdot a}_{n \text{ faktorer}}$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

**Regler:**

$$a^n \cdot a^m = a^{n+m}$$

$$\frac{a^n}{a^m} = a^{n-m}$$

$$(a^n)^m = a^{n \cdot m}$$

$$(a \cdot b)^n = a^n \cdot b^n$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

## Potenser / Kvadratrøtter

Definisjon:

$$x = \sqrt[n]{a} \iff a = x^n \quad a > 0, \ n \text{ naturlig tall}$$

$$a^{\frac{1}{n}} = \sqrt[n]{a} \quad a > 0, \ n \text{ naturlig tall}$$

$$a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m \quad \text{eller} \quad a^{\frac{m}{n}} = \sqrt[n]{a^m} \quad a > 0, \ n \text{ naturlig tall, } m \text{ helt tall}$$

$$a^x = \lim_{q \rightarrow x} a^q \quad x \text{ irrasjonalt tall } q \in \mathcal{Q}$$