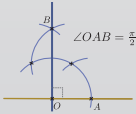
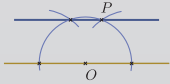


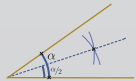
## Construccions bàsiques



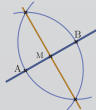
Perpendicular



Paral·lela

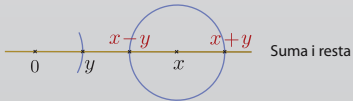


Bissecar un angle

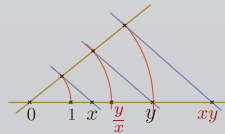


Bissecar un segment

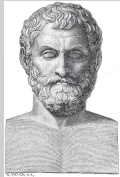
## Operacions aritmètiques



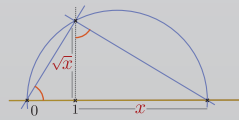
Suma i resta



Producte i divisió



Tales de Milet  
~600 a.C.



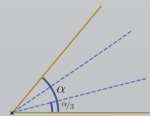
Arrels quadrades

## Construccions impossibles



Quadratura del cercle

$\pi$  és transcendent  
F. von Lindemann -1882



Trisecció de l'angle



Polígons no constructibles

**Teorema (Gauss-Wantzel)** El polígon regular de n costats és constructible si i només si

$$n = 2^k P_1 P_2 \dots P_r$$

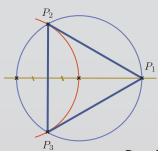
on  $P_i = 2^{n_i} + 1$  són primers i diferents.

Primers de Fermat coneguts ( $F_k = 2^{2^k} + 1$ )

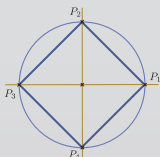
$F_0 = 3, F_1 = 5, F_2 = 17, F_3 = 257$  i  $F_4 = 65537$ .

# Construccions de polígons

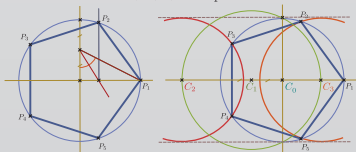
**Triangle**  
 $\cos(2\pi/3) = -\frac{1}{2}$



**Quadrat**  
 $\cos(\pi/2) = 0$

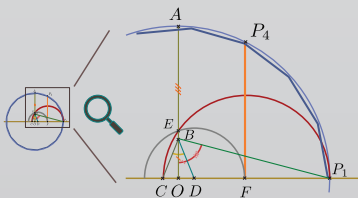


**Pentàgon**  
 $\cos(2\pi/5) = \frac{\sqrt{5}-1}{4}$



**Heptadecàgon**

$$\cos(2\pi/17) = -\frac{1}{16} + \frac{1}{16}\sqrt{17} + \frac{1}{16}\sqrt{34 - 2\sqrt{17}} + \frac{1}{8}\sqrt{17 + 3\sqrt{17} - \sqrt{34 - 2\sqrt{17}} - 2\sqrt{34 + 2\sqrt{17}}}$$



$$\begin{aligned} 3OB &= BA \\ 3\angle OBD &= \angle DBP_1 \\ \angle CBD &= \pi/4 \\ DE &= DF \\ FP_1 &= \sin\left(\frac{6\pi}{17}\right) \end{aligned}$$

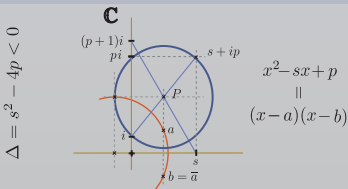
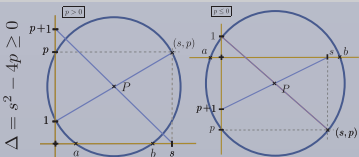
$P_1, P_4, P_7, P_{10}, P_{13}, P_{16}, P_2, P_5, \dots$

Carl F. Gauss 1877-1855



# Resolució d'equacions

Cercles de Carlyle



grau grau  
 d'estadística de matemàtiques  
 aplicada

[mat.uab.cat/gea](http://mat.uab.cat/gea) [mat.uab.cat/gmat](http://mat.uab.cat/gmat)

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