

CSCI 314 : Algorithms

Note Title

8/26/2013

Announcements

- Syllabus

- HW 0 - due next Wed.

What is an algorithm?

Set of steps to solve a problem.

Side question: what is a program?

- program could be built from algorithms
- implementation of an algorithm

Origins:

- Greek algos ($\alpha\lambda\gammaος$): "pain"
- 9th century writer or mathematician
Abu 'Abd Allah Muhammad ibn Musā
Al-Khwārizmī
(also origin of algebra)
- Popularized the decimal system, including 0 as a place-holder.
- Later known as algorism & popularized by Leonardo of Pisa (Fibonacci)

Example : a song

BOTTLESOFBEER(n):

For $i \leftarrow n$ down to 1

Sing " i bottles of beer on the wall, i bottles of beer,"

Sing "Take one down, pass it around, $i - 1$ bottles of beer on the wall."

Sing "No bottles of beer on the wall, no bottles of beer,"

Sing "Go to the store, buy some more, n bottles of beer on the wall."

Example: Euclid's algorithm to x or \div

Ques 10: *(Construct the line perpendicular to l and passing through P .)*

RIGHTANGLE(ℓ, P):

Choose a point $A \in \ell$

$A, B \leftarrow \text{INTERSECT}(\text{CIRCLE}(P, A), \ell)$

$C, D \leftarrow \text{INTERSECT}(\text{CIRCLE}(A, B), \text{CIRCLE}(B, A))$

return LINE(C, D)

Construct a point Z such that $|AZ| = |AC||AD|/|AB|$.

MULTIPLYORDIVIDE(A, B, C, D):

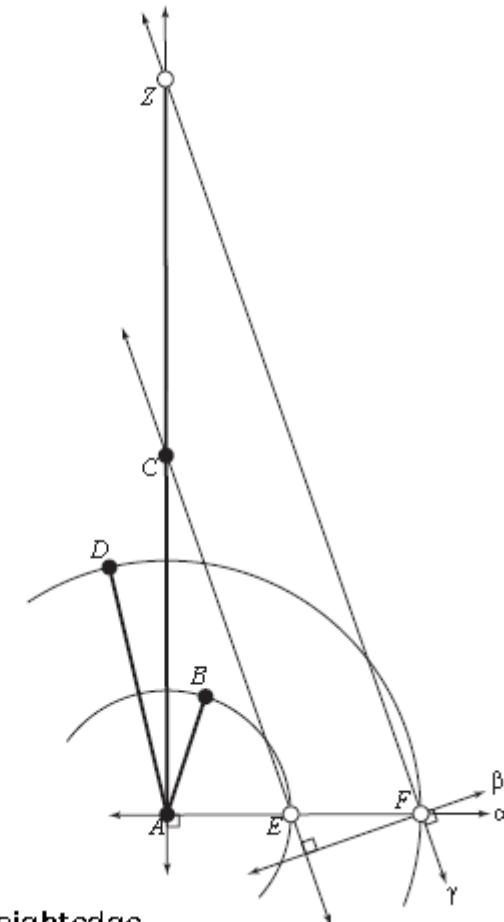
$$\alpha \leftarrow \text{RIGHTANGLE}(\text{LINE}(A, C), A)$$

$E \leftarrow \text{INTERSECT}(\text{CIRCLE}(A, B), \alpha)$

$$F \leftarrow \text{INTERSECT}(\text{CIRCLE}(A, D), \alpha)$$

$\beta \leftarrow \text{RIGHTANGLE}(\text{LINE}($

$$\gamma \leftarrow \text{RIGHTANGLE}(\beta, F)$$



Multiplying or dividing using a compass and straightedge.