

CS 4349.006

Kyle!

Expectations:

discrete structures

proofs

<https://personal.utdallas.edu/~kyle.fox/courses/cs4349.006.21f/>

"Required" book: CLRS

"Recommended!": Erickson
- Algorithms -

Grading:

Homework: 30%

Exams:

2 Mid terms: 20% each

Final : 30%

Homework:

Free 24 hour extensions:

Ask

May submit in pairs

May cite things & get
full credit. Write in own
words.

algorithm:

explicit, precise,

unambiguous,

mechanically

executable

sequence of elementary
instructions

Bottle Of Beer(n):

says how to sing n Bottles
of Beer on the Wall

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.*"

array $X[0..m-1]$

$$x = m-1$$

$$\sum_{i=0}^x X[i] \cdot 10^i$$

summation

$Y[0..n-1]$

$$y = \sum_{j=0}^{n-1} Y[j] \cdot 10^j$$

goal:

compute

$$z = x \cdot y =$$

$$m+n-1$$

$$\sum Z[k] \cdot 10^k$$

$$k=0$$

$$z[0..m+n-1]$$

FIBONACCI MULTIPLY($X[0..m-1]$, $Y[0..n-1]$):

$hold \leftarrow 0$

for $k \leftarrow 0$ to $n + m - 1$

 for all i and j such that $i + j = k$

$hold \leftarrow hold + X[i] \cdot Y[j]$

$Z[k] \leftarrow hold \bmod 10$

$hold \leftarrow \lfloor hold / 10 \rfloor$

return $Z[0..m+n-1]$

Designing an Alg:

- what: precise specification of the problem being solved
- how: description of alg itself
- why: justify correctness
- how fast: running time

What:

- Translate "loose problems" into precise ones based on mathematical objects
- specify inputs, outputs, their "types", what your procedures do

how:

- don't write code. I'm human
- pseudocode with English statements is usually good
- maybe high level English summary also
- comments are useful!

why:

- correctness often isn't obvious
- algs should be correct for every input
- correctness usually is more important than speed
- + do what we ask!

How fast: use asymptotic notation ($O(_)$)

- review this Wed.