CS100J April 28 2005

Course evaluation. Please complete the online course evaluation form for CS100J. It does indeed help us improve the course.

Completion of the evaluation counts toward your course grade (1%, like a quiz), and we expect 100% you to complete it.

After the submission period, we are sent a list of students who completed the evaluation. We do NOT know what you, as an individual, said.

About grades

About grades. The CMS computes a total score for you, based on the weight we give to each part of the course. On the CMS, you see the weight, but not your total score! Future versions of CMS will show you your score.

We will email each of you your total score and the average total score soon. It will include everything except A5, A6, and the final.

I do not formally curve the course grades based on median, standard deviation, etc. Last time I taught this course, the grades went like this:

A: 35%   B: 40%   C: 24%

I cannot tell what the percentages will be this time until I do the grading. The final counts a lot, as do the prelims.

Matlab functions

Finding out the syntax of functions. Click the Help button in Matlab. In the window that opens, search for “functions”.

M-files: scripts or functions. The M-file name, less its extension, is what MATLAB searches for when reference the script or function.

If file containing a function is named bsearch.m, then you can call

bsearch(*arguments*)

Functions bsearch

```
% r is sorted. Store in h a value to truthify
%   r[1..h] <= x < r[h+1..nocols]
function h= bsearch(r, x)
nocols= length(r);
h= 0;  k= nocols + 1;
% inv: r[1..h] <= x < r[k..nocols]
while ( h+1 < k )
   e=  floor( (h+k)/2);
   if r(e) <= x
      h= e;
   else
      k= e;
   end
end
```

specification

Header. Parameters are r and x. Body stores result in variable h

body

Statement return; in the body terminates execution of the body

Matlab functions

Put this function in file stat.m

```
% = [mean, standard deviation] of vector x
function [mean,stdev] = stat(x)
n= length(x);
mean= sum(x)/n;
stdev= sqrt(sum((x-mean).^2/n));
```

Result is an array of two values. Body has to assign to both mean and stdev.

Function has one parameter: x

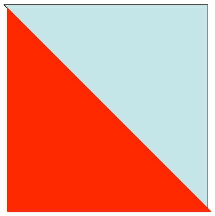
Subfunctions

```
% = [mean, standard deviation] of vector x
function [mean,stdev] = stat(x)
n = length(x);
mean = avg(x)/n;
stdev = sqrt(sum((x-mean).^2/n));


% = sum of values of x divided by n
function m = avg(x, n)
m= sum(x)/n
```

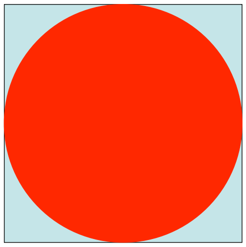
avg is a “subfunction”. Can be called only within this file.

Calculating pi using a dart board



If you throw random darts at this dart board and they all hit it, what percentage of them do you expect will land in the red area?

Calculating pi using a dart board



Area of circle with radius r:
pi r*r

It's a 2 x 2 square

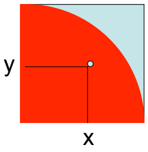
Area of square: 4

Area of circle: pi r*r = pi

pi/4 of them are expected to hit the dartboard!

If you hit this dart board with random darts, what percentage of them will land in the red area?

Calculating pi using a dart board



Area of circle with radius r:
pi r*r

It's a 1 x 1 square

Area of square: 1

Area of ¼ of circle: pi/4

(x,y) is in red area if x*x + y*y <= 1

Percentage of darts expected to land in red area: pi/4

Wallis (1616-1703) approximation to pi

$$pi / 2 = \frac{(2*2) * (4*4) * (6*6) * \ldots}{(1*3) * (3*5) * (5*7) * \ldots}$$

Euler (1707-1783) approximation to pi

$$pi*pi / 6 = 1/(1*1) + 1/(2*2) + 1/(3*3) + 1/(4*4) + \ldots$$