CS 1132 lecture 3

I. Printing with printf()
   a. First argument is format string, subsequent arguments are substitution values
   b. Right-aligned within total number of columns – good for tables
   c. Fixed-point: absolute precision
   d. Floating-point (scientific notation): relative precision (sig-figs)
   e. Must explicitly request end of line with ‘\n’
   f. To capture full precision of double values, must use %.17e (or %.17g)

II. Relational operators
   a. Cannot write “in between” relations – each operation evaluates to 0 or 1

III. Logical operators
   a. Short-circuit behavior
   b. Avoid evaluating expensive, invalid expressions

IV. Visualization for Monte Carlo estimator
   a. plot() syntax
   b. “hold on”: Overlay subsequent plots
   c. “axis equal”: Preserve geometry (consider if x and y have same units)
   d. Demo

V. Example: estimate pi via annulus
   a. Relate area ratio to pi
   b. Compound condition for “hit”

VI. while-loop
   a. Indefinite iteration
   b. Does not include counter
   c. Can do anything a for-loop can
   d. Loop patterns
      i. Repeat N times
      ii. Repeat until stopping signal

VII. Vectors
    a. All variables in MATLAB store matrices
    b. Indexing
i. Starts at 1
ii. Ends with length(v) (or keyword “end”)
iii. Syntax: parentheses
c. Creating
   i. zeros(), ones(), rand()
   ii. linspace()
   iii. Range expression
   iv. Literals (square brackets)
      1. Spaces, commas separate columns (create row-vectors)
      2. Semicolons separate rows (create column-vectors)

VIII. Example: Cumulative sum

```matlab
function csum = cumulativeSum(v)

% csum is the vector of cumulative sums of vector v.
% Assume v is not empty.
```

IX. Plotting vectors
   a. Can plot lines
   b. Can plot many points without “hold on” (and will be faster)