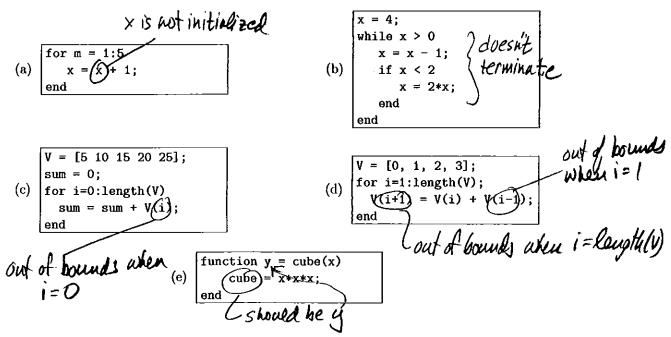
0 + name		(Note: This is worth 2 points if done fully correctly. No partial credit.)
1		Your Name: Version b Key Section Time/Section #:/ Your TA's Name: Version b
2		
3		
4		
5		
6		
total		

Problem 1. [10 points] Partial code for a MATLAB implementation of the bisection method is below. Fill in the blanks with the correct code. (Note: the code assumes that initially f(xlow) and f(xhi) have opposite signs.)

Problem 2. [25 points] Each box below shows the contents of a single MATLAB script, which will be executed with an empty workspace. Each script has at least one error. Indicate and explain all the problems.



Problem 3. [20 points] Consder the following sequence of MATLAB commands:

Compute the results of the following MATLAB commands. If the operation is not defined for the given operands, write "error".

a. A + B 
$$\begin{bmatrix} 2 & 2 & 0 \\ 2 & 2 & 0 \\ 2 & 5 \end{bmatrix}$$
 b. A - C error

c. A .\* F error

d. C \* D'

$$C = \begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}$$

$$D = \begin{bmatrix} 2 & 1 \\ 9 & 5 \\ 3 & 7 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}$$

$$C = \begin{bmatrix} 2 & 4 & 3 \\ 1 & 5 & 7 \end{bmatrix}$$

$$C \times D' = \begin{bmatrix} (2+3) & (9+15) & (3+21) \\ (4+5) & (18+25) & (6+35) \end{bmatrix} = \begin{bmatrix} 5 & 24 & 24 \\ 9 & 43 & 41 \end{bmatrix}$$

Problem 4. [16 points] Next to each root-finding method below, write the letters of all the characteristics (below) that apply to it.

Newton's Method

g\_

Bisection Method

[c],d

Fixpoint Method

b

MATLAB's roots() function

a,[c],e,f

- a. Only works with equations involving polynomials.
- b. Diverges if magnitude of the slope of the function exceeds 1.
- c. Guaranteed to converge.
- d. Requires knowledge of an interval containing at least one root.
- e. Does not require any initial guess.
- f. Returns all roots.
- g. Diverges if the slope of the slope of the function is close to zero.

Problem 5. [10 points] Write down the value of the variable V after the following script executes:

$$V = [2 \ 4 \ 6 \ 0 \ 10];$$

R = V;

for i=2:length(V)

$$R(i) = (V(i-1)+V(i))/2;$$

end

V = R;

$$R = [2, 3, 5, 3, 5]$$

Problem 6. [9 points] For each of the following situations, indicate the most appropriate kind of plot or graph.

- a. You have measured the buckling load of steel rods of various diameters, and you want to compare it with the theoretical load predicted by a well-known formula.
  - A set of pie charts, one for each diamter, showing what fraction of the rods of that diameter buckled at the predicted load.
  - A scatter (x-y) plot showing measured values (x=diameter, y=load), and also showing a smooth curve of the formula for the predicted load at all diameters.
  - A bar chart with two bars for each diameter, showing the measured and predicted buckling loads for that diameter.
  - A series of histograms, one for each rod diameter, showing the number of rods of that diameter that buckled at each load.
- b. You have surveyed CS 221 students about how much time they spent working on problem set 3, and you want to show the distribution of that time.
  - A pie chart with a "slice" for each student, with the size of the slice indicating the amount of time that student spent.
  - A scatter (x-y) plot showing individual points (x=student ID number, y=amount of time).
  - A histogram with bar height indicating the number of students who spent each amount
    of time, with "buckets" of size one hour, from 0 up to the maximum of 12 hours.
  - A Pareto chart, with bars indicating the number of students who spent each amount of time, and a curve indicating the cumulative percentage of students who spent up to that amount of time.
- c. You want to compare monthly manufacturing output between 2009 and 2010.
  - Two pie charts, each with 12 slices, showing the fraction of each year's output produced in each month.
  - A histogram, with bar height indicating the number of months in the two-year span in which production was at a given level.
  - A scatter (x-y) plot with individual points (x=month & year, y=number of units manufactured).
  - A bar chart with bar height indicating number of units produced, with two different-colored bars for each month, one for 2009 and one for 2010.