

EXERCISE 1: Practice with loops and logical indexing. Assume $x1=[1\ 8\ -7\ 2\ -9\ -3]$ to help you test your answers.

a) Write the following without loops:

```
for i=1:length(x1)
    if x1(i)>0
        x2(i)=1;
    else
        x2(i)=0;
    end;
end;
```

b) Write the following using a loop

```
x2=x1(1:end-1)>x1(2:end);
```

c) What is in x2 after executing this piece of code? Use `x1=[1 8 -7 2 -9 -3]`

```
x2=x1(x1(1:end-1)>x1(2:end))
```

d) Write the following using a loop

```
ix=find(x1(1:end-1)>x1(2:end))  
x2=x1(ix);
```

EXERCISE 2: The points on a circle, radius R , centered at an x,y position (x_C , y_C) are given by their x,y positions.

$$x = x_C + R \cos\theta$$

$$y = y_C + R \sin\theta$$

where θ is the angle between the x -axis and the line from the center of the circle to any given point on the circle. i.e., θ goes from 0 to 2π .

Write a function called `getcirc` that will take as input the variables x_C , y_C , R and the number of points on the circle (N) in that order and return a vector x and a vector y in that order containing the x and y coordinates of the N points on the circle.

Add a subfunction called `checkRN` that checks that the radius R is positive and that the number of points is at least 20 (for a reasonably smooth circle).

EXERCISE 3. The following script is supposed to call the function `getcirc` to calculate a circle that has radius 15, is centered at $(\pi, 1)$ and then plot the resulting circle. You can assume the subfunction `checkRN` has been correctly implemented inside `getcirc`. What are the bugs in this script?

```
% test script to call getcirc

close all;
clear all;

N=15;
Rp=100;
xc=1;
yc=pi;

[yp,xp]=getcirc(xc,yc,R,N);

figure(1), set(gca, 'FontSize',18);
plot(xp,xp,'k-');
xlabel('X (km)');
ylabel('Y (km)');
title('Testing my circle function');
axis('equal');
```

EXERCISE 4. Add some code to your debugged version of the script above that will write the (x,y) coordinates of the points on the circle to a file called `mycirc.dat`. Write out the x,y positions as 2 columns (col 1 = x positions, col 2 = y positions). Add a header line that contains the numerical values for (xc,yc), R and N. Format any real numbers so that e.g. the number 101.254 is written in the form 1.013e+02.