# ES 314 Advanced Programming, Modeling and Simulation
# Fall 2012

**Home Work # 1**

*Due: September 10, 2012*

*Instructions for submission: (1) type-set your solution by taking the screen shot of the Matlab session in which your code is tested with at least two inputs. (For problems 1 and 4, there is no input so just show the output. (2) prepare all your solutions in a single document, print a hard-copy and bring it to class.*

1) Write a one-line command in Matlab that produces the 26 capital letters of the alphabet. That is, the output to your command should be ABCDEFGHIJKLKMNOPQRSTUVWXYZ. However, the expression cannot be simply:

>> 'ABCDEFGHIJKLKMNOPQRSTUVWXYZ'

Instead, the command should have less than 10 characters.

2) Write a code segment in Matlab that has the effect of retaining only the first k items of vector A that are in ascending order. Your code should work for vectors of any length.

```
>> a = [1 3 5 7 6 11 2 21];

>> a(1:find([a(2:end), a(end)]-a < 0))
ans =
    1 3 5 7
```

3) Write a statement in Matlab to accomplish the following effect:

```
>> x = [1 4 12 9 23 18];
>> [x(mod(x,2)==1, x(mod(x,2)==0]

ans =

  1 12 23 4 9 18
```

i.e., arrange x so that all numbers in odd positions of x are moved to the front. Your code should work vectors of all lengths, not just 6.

4) Write a script in Matlab to draw: the triangle connecting the points A(2, 6), B(1, 9) and C(5, 11). Then draw the circumcircle through the points A, B and C. (Hint: Draw the perpendicular bisectors of the line segments AB and BC, find the point of intersection O. Draw a circle with O as center, and passing through OA. Your submission should include the script as well as the screen shot of the output when the script is run.

The script is as shown below:

```
% A(2, 6), B(1, 9) and C(5, 11)
x1 = 2;
x2 = 1;
x3 = 5;
y1 = 6;
y2 = 9 ;
y3 = 11;
xlim([0, 6]);
ylim([0,12]);
mx1 = (x1 + x2)/2;
mx2 = (x1 + x3)/2;
my1 = (y1 + y2)/2;
my2 = (y1 + y3)/2;
s1 = (x1-x2)/(y2-y1);
s2 = (x1 - x3)/(y3-y1);
% y = my1 + (x - mx1)* s1
% y = my2 + (x - mx2)* s2
A = [s1, -1; s2, -1];
c = [s1*mx1 - my1; s2*mx2 - my2];
center = A^(-1)*c;
cx = center(1);
cy = center(2);
r = sqrt((x1-cx)*(x1-cx) + (y1-cy)*(y1-cy))
r1 = sqrt((x2-cx)*(x2-cx) + (y2-cy)*(y2-cy))
theta = linspace(0, 2*pi, 100);
xval = r*cos(theta)+cx;
yval = r*sin(theta)+cy;
plot([x1,x2,x3,x1], [y1,y2,y3,y1], xval, yval);
axis('equal')
```

The output from running the script is as shown below:

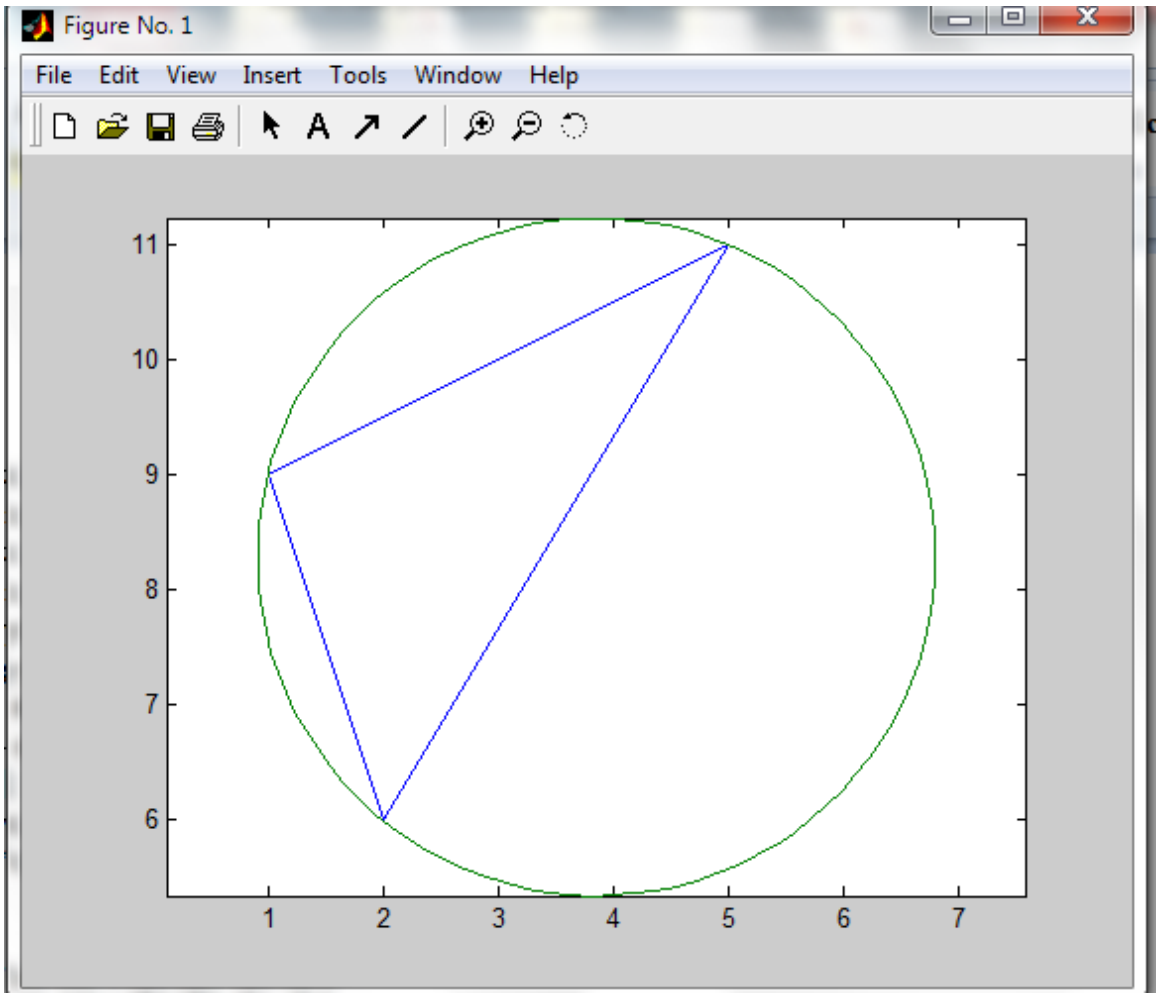
Figure No. 1
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