

The problems in this worksheet are designed to give you extra practice for prelim 1 and **do not need to be submitted**. You should complete these problems as if you were taking the exam: write the answers to the questions on paper then check your answers on MATLAB once you are happy with your solution!

1 What is printed?

What will be printed when the following script is executed?

<i>Script</i>	<i>Function</i> (in foo.m)	<i>Answer:</i>
<pre>D = 15; L = 5; M = 0; D = D + L + M; foo(L, D, M) fprintf("%d \n", D) fprintf("%d \n", L)</pre>	<pre>function foo(a,b,c) fprintf("%d \n", a-c) fprintf("%d \n", rem(b,a)) fprintf("%d \n", floor(c+0.5)) fprintf("%d \n", ceil(rand)) disp(~(a >= b && a ~= b)) end</pre>	

2 Gambling

Implement the following function as specified:

```
function [remain, nTurns, bestWinStreak] = gamblersRuin(d)
% Simulate a game in which a gambler starts with d dollars. On each turn
% the gambler is equally likely to win $1 or lose $1. The gambler leaves
% and the simulation ends when he has at least doubled his money, when he
% has less than $1, or after he has played 100 turns, whichever occurs first.
% d: the dollar amount the gambler starts with. Assume d > 1
% remain: the dollar amount the gambler leaves with
% nTurns: the number of turns the gambler plays in the simulation
% bestWinStreak: the longest consecutive run of $1 gains during the
% simulation. If the gambler never wins a turn then bestWinStreak is 0.
% For example, if the simulation has this sequence of outcome:
% win loss loss win win win loss loss win win loss loss loss loss
% then the gambler's longest winning streak is 3.
```

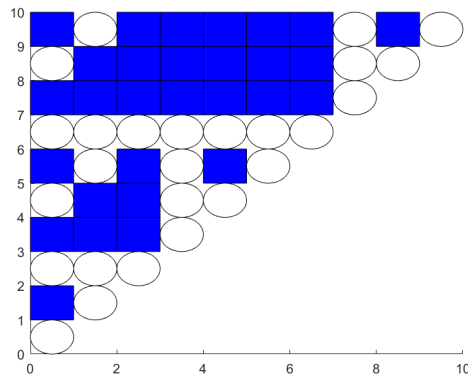
3 Binomial triangle

Complete the following problem assuming you have access to the functions `DrawRect(a,b,L,W,c)` which draws a rectangle at vertices (a,b) , $(a+L,b)$, $(a+L,b+W)$, and $(a,b+W)$ with color c and `DrawDisk(xc,yc,r,c)` which draws a circle of radius r , center (xc, yc) , and color c . For colors, $c = 'w'$ corresponds to white and $c = 'b'$ corresponds to blue. Recall that the binomial coefficient formula “ n -choose- k ” corresponds to

$$\binom{n}{k} = \frac{n!}{k!(n-k)!}$$

```
function binomial_triangle(m, sidelength)
% Print a right triangle of disks and squares that correspond to whether or not binomial
% coefficients are even or odd. Let the bottom row correspond to 1-choose-1, and let the row
% one level up be the 2-choose elements (2-choose-1 on the left and 2-choose-2 on the right).
% The kth row starts at k-choose-1 and ends with k-choose-k. If the binomial coefficient is
% even, draw a blue square, if it is odd, draw a white disk. Your output should match the
% figure example on this page. The radius of each circle should be sidelength/2 and the
% length of each square should be sidelength. Adjacent shapes should be touching (as seen below).
% The circle in the first row should be centered at (sidelength/2,sidelength/2).
% Assume m is an integer >= 1 and side length is some real number greater than zero.
% There should be m rows of shapes.
close all
figure
hold on
```

hold off



A function call of `binomial_triangle(10, 1)` should create the image to the left.