CS1112 Discussion Exercise 5

Do *not* use arrays.

1. Write a function y = Mid3(a,b,c) that returns the middle of the three values a, b, and c.

2. Complete the following function so that it performs as specified

```
function [s,c] = Trig(a)
% s and c are the sine and cosine of angle a.
% a is the measure of an angle in degrees (assumed positive).
```

Write a script that uses Trig to produce a table of sine and cosine values for $0^o, 1^o, \ldots, 90^o$.

3. Complete the following function so that it performs as specified:

```
function x = IsPythag(a,b,c)
% x has the value of 1 if a triangle with sides a, b, and c is
% a Pythagorean triangle and 0 otherwise.
% a, b, and c are positive integers.
```

4. The following function produces a pretty good estimate of $\sin(x)$ if $|x| \leq 2\pi$:

```
function y = MySin0(x)
% y is an approximation of sin(x).
y= x;
for k= 1:8
    y= y + (-1)^k *x^(1+2*k) /factorial(1+2*k);
end
```

It is horrible if $|x|$ is large. Using the fact that the sine function is periodic, write a function MySin1(x) that produces a good sine approximation for any x. Make effective use of MySin0.

5. Consider the binomial coefficient

$$\left(\begin{array}{c} n \\ k \end{array} \right) = \frac{n!}{k!(n-k)!}$$

We will call this value "n-choose-k". Complete the following function so that it performs as specified:

```
function d = digitsOfBinCoef(n,k)
% d is the number of digits required to write the binomial coefficient
% n-choose-k
```

Recall that if x houses a positive integer, then the value of floor(log10(x))+1 is the number of base-10 digits that are required to write the value of x. Make use of built-in function factorial.

6. Last week, you did an exercise to produce ten lines of output where the nth line displays the number of digits required to write down each of the binomial coefficients

$$\left(\begin{array}{c} n \\ 1 \end{array} \right), \left(\begin{array}{c} n \\ 2 \end{array} \right), \ldots, \left(\begin{array}{c} n \\ n \end{array} \right)$$

Write a script showDigitsOfBinCoefs to solve this problem again, but now make use of function digitsOfBinCoef from above.