

# Homework #2 (MATLAB Review II) David M Vermillion

## 1) Lottery

[Entered in a separate matlab file labeled myfactfn.m]

```
function y = myfactfn(n)
f = n;
if n == 0
    y = 1
elseif n < 0
    disp('Input must be positive')
else
    while n > 1
        n = n-1;
        f = f*n;
    end
    f
end
end
```

---

[Entered in a separate matlab file labeled myBinom.m]

```
function y = myBinom(n,r)
if (n > 0) & (r > 0)
    y = myfactfn(n) / (myfactfn(r)*myfactfn(n-r));
end
end
```

```
function y = myfactfn(n)
f = n;
if n == 0
    y = 1;
elseif n < 0
    disp('Input must be positive')
else
    while n > 1
        n = n-1;
        f = f*n;
    end
    y = f;
end
end
```

---

[Entered in a separate matlab file labeled LotteryProb.m]

```
function P = LotteryProb(m,r,n)
% m = number of correct guesses
% r = number of numbers needing to be guessed
% n = number of numbers available
```

```
y = (myfactfn(r) / ((myfactfn(m)*myfactfn(r-m)) * (myfactfn(n-r))) / (myfactfn(r-  
m)*myfactfn((n-r)-(r-m)))) / myBinom(n,r)  
end
```

```
function y = myBinom(n,r)  
if (n > 0) & (r > 0)  
    y = myfactfn(n) / (myfactfn(r)*myfactfn(n-r));  
end  
end
```

```
function y = myfactfn(n)  
f = n;  
if n == 0  
    y = 1;  
elseif n < 0  
    disp('Input must be positive')  
else  
    while n > 1  
        n = n-1;  
        f = f*n;  
    end  
    y = f;  
end  
end
```

```
>> LotteryProb(2,5,30)
```

```
y =
```

6.7082e-52

---

```
a = [0;1;2;3;4;5];  
b = [LotteryProb(a(1),5,30); LotteryProb(a(2),5,30); LotteryProb(a(3),5,30);  
LotteryProb(a(4),5,30); LotteryProb(a(5),5,30); LotteryProb(a(6),5,30)];  
c = table(a,b);  
c.Properties.VariableNames = {'Number_Correct','Probability'}
```

```
>> Lottery_Progressive_Prob
```

```
c =
```

6×2 table

Number\_Correct    Probability

---

0	1.5496e-51
1	1.8447e-51
2	6.7082e-52
3	8.7498e-53
4	3.6457e-54
5	2.9166e-56

## 2) Cross Product

[Entered in a separate matlab file labeled xproduct.m]

```
function w = xproduct(v,u)
[ ((v(2).*u(3))-(v(3).*u(2))), ((v(3).*u(1))-(v(1).*u(3))), ((v(1).*u(2))-(v(2).*u(1)))]
end
```

---

```
v1 = [1 3 0];
u1 = [5 -7 0];
xproduct(v1,u1)
```

```
v2 = [-6 1 3];
u2 = [5 0 -7];
xproduct(v2,u2)
```

```
>> HW3p2
```

```
ans =
```

```
0 0 -22
```

```
ans =
```

```
-7 -27 -5
```

```

function y = Tri_XPro(A,B,C)
AB = [(B(1)-A(1)), (B(2)-A(2)), (B(3)-A(3))];
AC = [(C(1)-A(1)), (C(2)-A(2)), (C(3)-A(3))];
b = xproduct(AB,AC);
y = 0.5*sqrt(sum(b.^2));
end

function w = xproduct(v,u)
w = [((v(2).*u(3))-(v(3).*u(2))), ((v(3).*u(1))-(v(1).*u(3))), ((v(1).*u(2))-(v(2).*u(1))))];
end

```

---

```

>> A1 = [1 2 0]; B1 = [-5 6 0]; C1 = [12 -1 0];
>> Tri_XPro(A1,B1,C1)

```

ans =

13

---

```

>> A2 = [1 2 -3]; B2 = [-5 6 2]; C2 = [12 -1 2];
>> Tri_XPro(A2,B2,C2)

```

ans =

47.7650

### 3) Fibonacci

```

f(1) = 1;
f(2) = 2;
fprintf('1\n1\n2\n')
% Last number in for line is 1 less than actual sequence count. I.e. i =
% 3:10 shows up to the 11th Fibonacci number.
for i = 3:19
    f(i) = f(i-1) + f(i-2);
    str = [num2str(f(i))];
    disp(str)
end

```

```

>> Fibonacci_Test
1
1
2
3

```

5  
8  
13  
21  
34  
55  
89  
144  
233  
377  
610  
987  
1597  
2584  
4181  
6765

```
format long
f1(1) = 1;
f1(2) = 2;
f2(1) = 1;
f2(2) = 2;
f3(1) = 1;
f3(2) = 2;
% Last number in for line is 1 less than actual sequence count. I.e. i =
% 3:10 shows up to the 11th Fibonacci number.
for i = 3:9
    f1(i) = f1(i-1) + f1(i-2);
end
n_10 = 1+sum((1./f1))

for i = 3:99
    f2(i) = f2(i-1) + f2(i-2);
end
n_100 = 1+sum((1./f2))

for i = 3:999
    f3(i) = f3(i-1) + f3(i-2);
end
n_1000 = 1+sum((1./f3))

>> Psi

n_10 =

    3.330469040763158
```

n\_100 =

3.359885666243178

n\_1000 =

3.359885666243178

## Resources

<https://stackoverflow.com/questions/5136447/function-for-factorial-in-python>

<https://www.artima.com/forums/flat.jsp?forum=181&thread=75931>

<http://www.matrixlab-examples.com/factorials.html>

<https://www.mathworks.com/matlabcentral/answers/90880-how-to-apply-the-sum-function-of-a-factorial-equation-without-using-the-factorial-function>

MATLAB Documentation

Office Hours

[http://tutorial.math.lamar.edu/Classes/CalcII/Vectors\\_Basics.aspx](http://tutorial.math.lamar.edu/Classes/CalcII/Vectors_Basics.aspx)

<https://www.geeksforgeeks.org/program-for-nth-fibonacci-number/>

<https://www.mathworks.com/matlabcentral/answers/157470-generating-fibonacci-sequence-using-while-loop>

<https://stackoverflow.com/questions/27608825/fibonacci-numbers-using-matlab>

<https://stackoverflow.com/questions/22222001/recursive-function-to-generate-print-a-fibonacci-series?noredirect=1&lq=1>