# Homework 2 – Answer Key

**1a.**

$Pr(S_n)=.8$

Given that each roll is independent, we can multiply the probability of getting a strike by itself three times.

$Pr(S_1 \cap S_2 \cap S_3)=.8*.8*.8=.512$

**1b.**

Not getting the Turkey is the complement of getting the Turkey.

In math terms we can say, Pr(Turkey) + Pr(No Turkey) = 1.

Pr(No Turkey) = 1-.512 = .488

**2a.**

S={HHHH, HHHT, HHTH, HTHH, THHH, HHTT, HTTH, TTHH, HTHT, THTH, THHT, HTTT, THTT, TTHT, TTTH, TTTT}

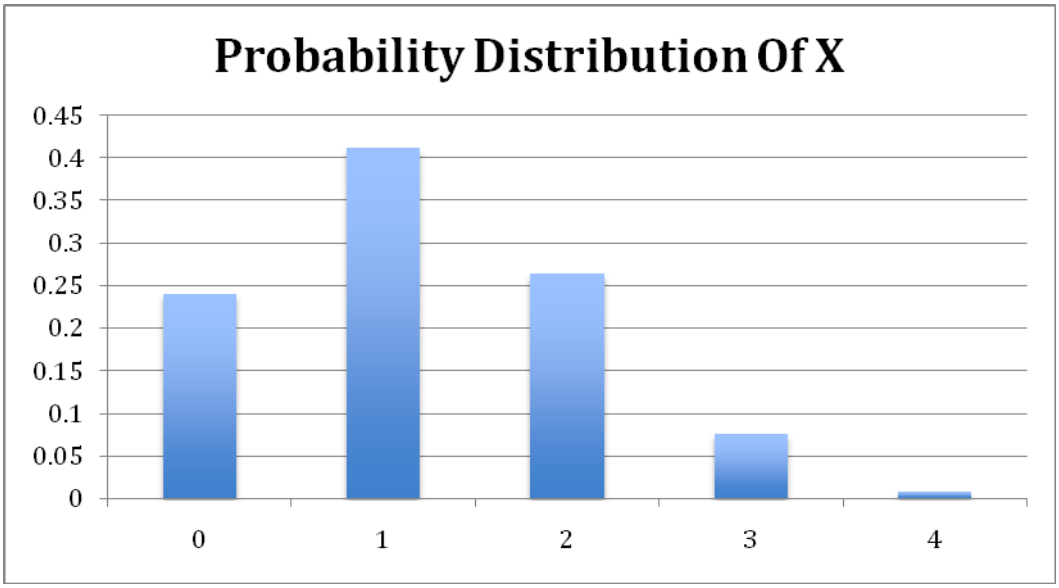
Pr(X=4) = .3*.3*.3*.3 = .0081

Pr(X=3) = (4)(.3*.3*.3*.7) = .0756

Pr(X=2) = (6)(.3*.3*.7*.7)= .2646

Pr(X=1) = (4)(.3*.7*.7*.7) = .4116

Pr(X=0) = (.7*.7*.7*.7) = .2401




**2b.**

$E[X]=\Sigma X_i*Pr(X_i)= 4*.0081+3*.0756+2*.2646+1*.4116+0*.2401 = 1.2$

**3.**

$Pr(A|B)=Pr(A\cap B)/Pr(B)$

Define event A to be drawing from the all-red-card bowl.

Define Event B to be drawing a red card.

$Pr(A\cap B)=4/8$ because there are 4 instances of a red card coinciding with the all-red-card bowl (The starred entries in the diagram below).

| All-Red-Card Bowl | Other Bowl |
|---|---|
| Red* | Red |
| Red* | Black |
| Red* | Black |
| Red* | Black |

$Pr(B)=5/8$ because there are 5 red cards out of 8 total.

$\Rightarrow Pr(A|B)=(4/8)/(5/8)=4/5=.8$

**4a.**

The probability that a wave is 6 ft tall is equal to 0. With all continuous variables, the probability of getting any single value is 0.

**4b.**

First we calculate the z-scores.

$z(6)=(6-6)/2=0$

$z(9)=(9-6)/2=1.5$

$Pr[z(6)<Z<z(9)]=Pr(0<Z<1.5)= Pr(Z<1.5)-Pr(Z<0)$

Then we look up the values for $Pr(Z<1.5)$ and $Pr(Z<0)$ on our tables and plug them in.

$Pr(0<Z<1.5) = .9332 - .5 = .4332$

**4c.**

Calculate z-scores:

$z(2)=(2-6)/2=-2$

$z(7)-(7-6)/2=.5$

$Pr[z(2)<Z<z(7)]=Pr(-2<Z<.5)=Pr(Z<.5)-[1-Pr(Z<2)]$

Look up values and plug-in:

$.6915 - .0227= .6688$

**4d.**

Define the first wave being between 4ft and 7ft as Event A.

Define the second wave being between 4ft and 9ft as Event B.

Find Pr(A):

$z(4)=(4-6)/2=-1$

$z(7)=(7-6)/2=.5$

$Pr[z(4)<Z<z(7)]=Pr(-1<Z<.5)=Pr(Z<.5)-[1-Pr(Z<1)]$

$=.6915 - .1586 = .5329 = Pr(A)$

Find Pr(B):

z(4)=(4-6)/2=-1

z(9)=(9-6)/2=1.5

Pr[z(4)<Z<z(9)]=Pr(-1<Z<1.5)=Pr(Z<1.5)-[1-Pr(Z<1)]

=.9332 - .1587 = .7745

Use formula for Pr(A or B):

$Pr(A \cup B)=Pr(A)+Pr(B)-Pr(A \cap B)$

Because the events are independent we can say:

$Pr(A \cap B)=Pr(A)*Pr(B)$

Plugging values into Pr(A or B):

$Pr(A \cup B)$= .5329+.7745-(.5329*.7745) = .8947