Homework #2
Economics 113
Introduction to Econometrics
Professor Spearot
Due Friday, October 10th, 2008 – Beginning of class

1. The Dude is an avid bowler. Since he is a master of relaxation, the probability of rolling a strike in any given frame is independent of all the others. Suppose that the probability of rolling a strike is 0.7 for each frame:

a. A perfect game requires 12 strikes in a row. What is the probability that The Dude rolls 12 consecutive strikes?

*Given that each strike is independent, you simply multiply the Pr(Strike) 12 times. That is Pr(12 strikes)= Pr(Strike)^12=**0.0138***

b. What is the probability that The Dude fails to roll a strike in at least one of the twelve attempts?

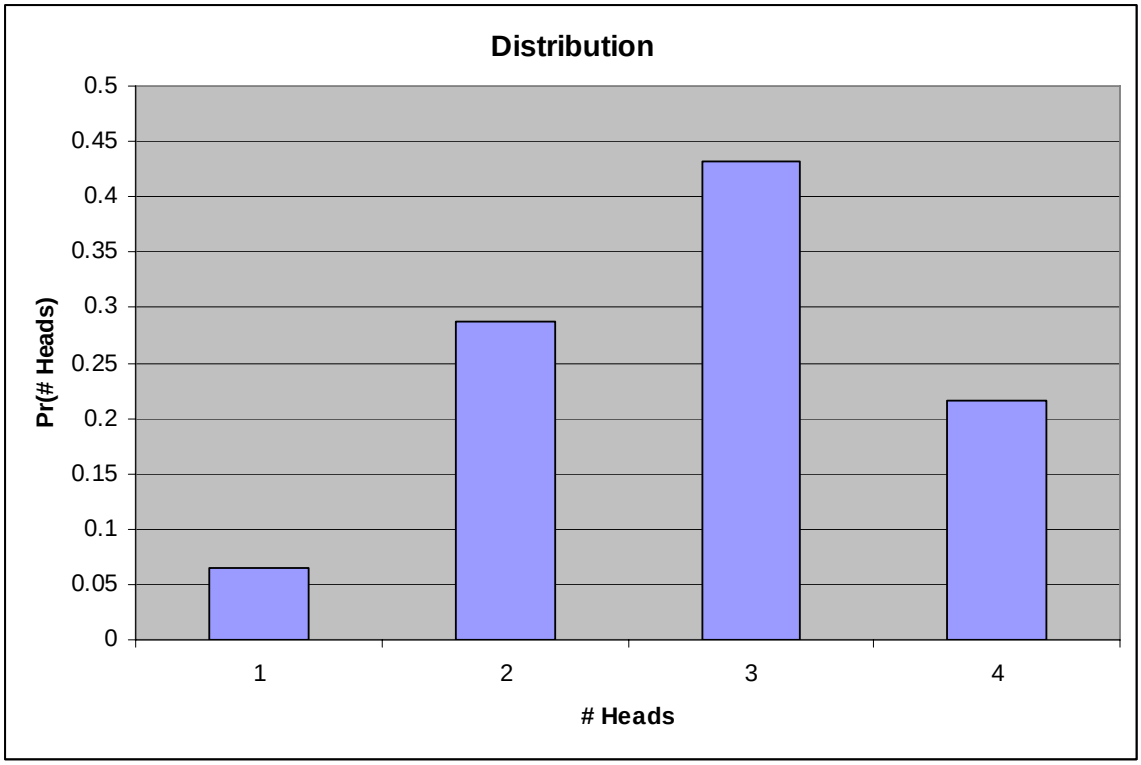
Failing to get 12 strikes is the complement of getting 12 strikes. So, the probability if not getting a strike in at least one frame is written as:
*Pr(at least one frame without a strike)=1-Pr(12 strikes)=1-0.0138= **0.9862***

2. Suppose that you join a game in which a coin is flipped three times. The probability of getting heads is 0.6. The random variable X is defined as the number of heads throughout the game.

a. Please solve for and diagram the probability distribution of X.

S={HHH,HHT,HTH,THH,HTT,THT,TTH,TTT}

Pr(H=0)=1(.4*.4*.4)= 0.064*
Pr(H=1)=3(.6*.4*.4)= 0.288*
Pr(H=2)=3(.6*.6*.4)= 0.432*
Pr(H=3)=1(.6*.6*.6)= 0.216*



b. What is the expected value of X?

*E(X)=0*0.064+1*0.288+2*0.432+3*0.216 =* ***1.8***

3. Suppose that there exists a 10-sided die with numbers 1-5 in Red and 6-10 in Blue. Calculate the probability of rolling an odd number given that the number you roll is blue.

S={1R,2R,3R,4R,5R,6B,7B,8B,9B,10B}

*Pr(Odd|Blue)=Pr(Odd&Blue)/Pr(Blue)=(2/10)/(5/10)=****2/5***

4. Wave height is distributed normally with mean 5ft and standard deviation 2 ft.

a. What is the probability that a wave is 6ft tall?

Zero. For a continuous random variable, the probability of being any specific value is zero.

b. What is the probability that a wave is between 6 and 7 feet tall?

First, compute Z scores.

z(6)=(6-5)/2=0.5

z(7)=(7-5)/2=1

*Pr(z(6)<Z<z(7))= Pr(Z<z(7))- Pr(Z<z(6))=0.8413-0.6915=**0.1498***

c. What is the probability that a wave is between 2 and 7 feet tall?

z(2)=(2-5)/2=-1.5

Pr(Z<z(2)) = Pr(Z<(-1.5)) = Pr(Z>(-1.5))= 1-Pr(Z<1.5)

*Pr(z(6)<Z<z(7))= Pr(Z<z(7))- (1-Pr(Z<1.5))=0.8413-(1-0.9332)= **0.7745***

d. Suppose that two waves are coming, and independent from one another. What is the probability that wave one is between 3 and 7 feet tall OR wave two is between 4 and 6 feet tall?

Call the first wave between 3 and 7 as event A
Call the second wave between 4 and 6 as event A

z(4)=(-0.5)
z(6)=(0.5)

Pr(A)=Pr(z(4)<Z<z(6)) = Pr(Z<z(6))- Pr(Z<z(4)) = Pr(Z<0.5)- Pr(Z<-0.5)
= Pr(Z<0.5)- (1-Pr(Z<0.5))
*= 2*Pr(Z<0.5)- 1*
*= 2*0.6915- 1*
= 0.383

z(3)=(-1)
z(7)=(1)

Pr(B)=Pr(z(3)<Z<z(7)) = Pr(Z<z(7))- Pr(Z<z(3)) = Pr(Z<1)- Pr(Z<-1)
= Pr(Z<1)- (1-Pr(Z<1))
*= 2*Pr(Z<1)- 1*
*= 2*0.8413- 1*
= 0.6826

Pr(A OR B)=Pr(A)+Pr(B)-Pr(A&B)
=Pr(A)+Pr(B)-Pr(A)Pr(B)
*=0.383+0.6826-0.383*0.6826*
=0.8042