Homework 0: CS 436/ 580L: Introduction to Machine Learning

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Academic Honesty Pledge

I have done this assignment completely on my own. I have not copied it, nor have I given my solution to anyone else. I understand that if I am involved in plagiarism or cheating I will have to sign an official form that I have cheated and that this form will be stored in my official university record. I also understand that I will receive a grade of 0 for the involved assignment for my first offense and that I will receive a grade of "F" for the course for any additional offense.

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Ans 1

Sample Space - (1,1)(1,2).... = 6*6=36

Rolling Doubles = (1,1)(2,2)....(6,6)

P(Rolling Doubles) = 6/36 = 1/6

Ans 2

For independent variables

P[a,b]=P(a)P(b)

0.2 = 0.5*P[Y]

P[Y] = 2/5

Ans 3

For the person to be in starting position after 10 steps he has to take 5 steps forward and 5 steps backward.

P(Forward Step)=0.6

P(Backward step)=0.4

As all these steps are independent

There are 10c5 ways to do it.

P(At starting position)=10c5 * (0.6^5) * (0.4^5)

Ans 4

E[Z]=E[X^2] * E[Y]

But E[X^2]=var[X]+(E[X]^2)

E[Z]=(var[X]+(E[X^2])) * E[Y]

E[Z]=(1+2^2)*3

E[Z]=15

Ans 5

Mean= (-1+1+4+6+10)/5=5

Median = 4

Variance = ((-1-5)^2+(1-5)^2+(4-5)^2+(6-5)^2+(10-5)^2)/5 = 79/5= 15.8

Ans 6

E(Win)=0.2*10$

E(Loss)=0.8*5$

E(Gain)=E(Win)-E(Loss)

E(Gain)=0.2*10 - 0.8*5 = 2-4 = -2$

Ans 7

Given first card was spade

Total spade = 12

Total Cards = 51

P(spade|first card is spade)=12/51 = 4/17

Ans 8

P(Head|White Ball)=P(White Ball|Head)P(Head)/P(White Ball)

P(White Ball|Head)=2/9

P(Head)=1/2

P(White Ball)=1/2*2/9 + 1/2*5/11

P(Head|White Ball)=(2/9*1/2)/(1/2*2/9 + 1/2*5/11)

P(Head|White Ball)=22/67

Ans 9

P(6 heads and 4 tails) = 10c6*p^6(1-p)^4

P(7 heads and 3 tails) = 10c7*p^7(1-p)^3

Like this-

10c6*p^6(1-p)^4 + 10c7*p^7(1-p)^7+10c8*p^8(1-p)^2+10c9*p^9(1-p)+10c10*p^10

Ans 10

If man wins in 1st chance = p

If man wins in 2nd chance = p*(1-p)

If man wins in 3rd chance = p*(1-p)^2

If man wins in nth chance = p*(1-p)^n

This is Geometric Distribution.