Homework 1

Yuqiao Meng

1. Array: [1, 2, -1, 4, 10]
    a. Mean = (1+2-1+4+10)/5=3.2
    b. Median = 2
    c. Variance = ((1-3.2)^2+(1-3.2)^2+(1-3.2)^2+(1-3.2)^2+(1-3.2)^2)/(5-1) = 17.7
2. E[Z] = E[(X^2)Y] = E[X^2]E[Y] = (Var[X] + E[X]^2)*E[Y] = (1+2^2)*3 = 15
3. P[Y|X] = P[X,Y]/P[X] = 0.5
4. log45 = log(5*3*3) = log5+log3+log3 = 2.32+1.58+1.58 = 5.48
5. The money he is likely to get is: E(money) = 90*0.05 + 10*0.1 + (-10)*(1-0.05-0.1) = 4.5+1-8.5 = -3. So I think he should not enter the lottery.
6. P = 10!/5!*(0.4)^5(0.6)^5 = 0.2006581248
7. The probability B win one round: P = 5/12, thus the probability of B win the game: P(B) = C_10^6(P)^6(1-P)^4 + C_10^7(P)^7(1-P)^3 + C_10^8(P)^8(1-P)^2 + C_10^9(P)^9(1-P) + P^10
8. 5 red, 5 green, 4 yellow, 6 white
    a. P(white) = 6 / (5+5+6+4) = 0.3
    b. P(Green) = 3 / (5+3+6+4) = 1/6
    c. P(white) = 6 / (5+2+6+4) = 6/17
    d. P(white) = P(the fourth ball is white)P(white | the fourth ball is white) + P(the fourth ball is not white)P(white | the fourth ball is not white) = 6/17*5/16 + 11/17*6/16 = 96/272
9. P(win) = 1/4*(20%+50%+50%+90%) = 0.525
10. Expected gain = n*(0.2*10+0.8*(-5)) = -2n