Solution to homework two

Sec 4.5 problem 1,26,28(a),(b),40

1: use O for obese, D for diabetes, OD for bothe obese and diabetes, then

(a) Answer=$P(D|O) = \frac{P(OD)}{P(O)} = 0.02/0.3 = 1/15$.

(b) Anser=$P(O|D) = \frac{P(OD)}{P(D)} = 0.02/0.03 = 2/3$.

26: Consider the sample space, which is (BG),(BB),(GB),(GG). while (BG) stands for older one is Boy, younger one is girl, etc. then $P(A) = 0.5, P(B) = 0.5, P(AB) = 0.25$, which shows that A,B are independent.

28.

(a) this can be assumed as independent.

(b) if he had a headache yesterday, then he is more likely to get into an accident yesterday, so NOT independent.

40.

(a) $0.7^4 + 0.3^4 = 0.2482$

(b) $0.7^2 * 0.3^2 = 0.0441$

(c) $1 - 0.7^4 = 0.7599$

(d) $4 * (0.7^3 * 0.3) + 0.7^4 = 0.6517$.

(e) $1 - 0.3^4 = 0.9919$

Sec 5.2 2,5,6,13

2: just look at the sample space in example 5.2, you can find out that P(W=0)=0.5, P(W=1)=0.25, P(W=2)=0.125, P(W=3)=0.125.

5: by writing out the sample space and counting, you can get the following, P(Y=1)=11/36, P(Y=2)=9/36, P(Y=3)=7/36, P(Y=4)=5/36, P(Y=5)=3/36, P(Y=6)=1/36.

6:

(a) X may take 0,0.5,1 hours.

(b) P(X=0)=3/9, P(X=0.5)=4/9, P(X=1)=2/9.

13: No, since the probability for any event can NOT be negative.

Sec 5.2 10,17

10: $P(X = 1) = 0.9^4 = 0.6561$, P(X=5)=0.3439 so E(X)=2.3756.

17: let T be the cost of case of component being tested, and W be the cost of case of component NOT being tested.

(a) E(T)=40, E(W)=95, should test

(b) E(T)=40, E(W)=47.5, should test

(c) E(T)=40, E(W)=9.5, should not test

(d) 950*p=40 will implies that 0.0421 is the answer.

Sec 5.4 2,8,17,19(b)

2: case in (a) will have largest variance, case in (c) will have smallest, and by numerical formula use var=np(1-p), you can confirm the answer.

8: E(X)=1*12/60+2*25/60+3*16/60+4*7/60=2.3

$Var(X) = 1 * 12/60 + 4 * 25/60 + 9 * 16/60 + 16 * 7/60 - 2.3^2 = 0.8433.$
17: VAR(3X)=9*VAR(X)=36, so SD(3X)=6.
19 (b): VAR(X-Y)=VAR(X)+VAR(-Y)=1+1=2