Chapter 3:

Q1: In article entitled "Bucket-Handle Meniscal Tears of the Knee: Sensitivity and Specificity of MRI signs" Dorsay and Helms (A-6) performed a retrospective study of 72 knees scanned by MRI. One of the indicators they examined was the absence of the "bow tie sign" in the MRI as evidence of a bucket-handle or "bucket-handle type" tar of the meniscal. In the study, surgery confirmed that 43 of the 73 cases were bucket-handle tears. The cases may be cross-classified by "bow tie sign" status and surgical results as follows:

	Tears Surgically Confirmed (D)	Tears Surgically confirmed as not Present ($\dot{D}^C$)	Total
Positive Test (absent bow tie sign (T)	38	10	48
Negative Test (bow tie sign Present) ($\dot{T}^C$)	5	15	23
Total	43	28	71

1.what is false negative?

(A)Probability that result of the test is positive given that patient has disease.

(B)Probability that result of the test is negative given that patient has disease.

(C)Probability that result of the test is positive given that patient doesn't have disease.

(D)Probability that result of the test is negative given that patient doesn't have disease.

2.What is false positive?

(A)Probability that result of the test is positive given that patient has disease.

(B)Probability that result of the test is negative given that patient has disease.

(C)Probability that result of the test is positive given that patient doesn't have disease.

(D)Probability that result of the test is negative given that patient doesn't have disease.

3.Compute the sensitivity of the symptom?

P(T/D) =38/43 =0.8837

4.Compute the specificity of the symptom?

$P(T^C/D^C)$ = 18/28 =0.6229

5.Suppose it is know that the rate of the disease in the general population is 0.1. What is the predictive value positive of the symptom?

$$P(D/T) = \frac{Sens..*P(D\ \ )}{Same+(1-Spec..)P(D^C)} = 0.2066$$

6.What is the predictive value negative of the symptom?

$$P(D^C/T^C) = \frac{Spec.*P(D^C)}{Same+(1-sens.)P(D)} = 0.9797$$

Chapter 4:

Q1: Given the following probability distribution of a discrete random variable X representing the number of defective teeth of the patient visiting a certain dental clinic

X	P(X= x)
1	0.25
2	0.35
3	0.20
4	0.15
5	K

1. The value of the k is …0.05…
2. P (x < 3) = 0.6
3. P(X ≤ 3) =0.8
4. P(X < 6) = 1
5. P(X = 3.5) =0
6. Probability that the patient has at least 4 defective Teeth ……0.20…….
7. Probability that the patient has at most 2 defective Teeth ……0.6…….
8. The expected number of defective teeth (Mean) = 2.4
9. The variance of X is ……1.34……..

Chapter 5:

Q1: The same survey data base cited shows that 32 % of U.S. adults indicated that they have tested for HIV at some point in their life. Consider a simple random sample of 15 adults selected at that time. Find the probability that the number of adults who have been tested for HIV in the sample would be:

1.Three .

P(X = 3) =0.14574

2.Less than five.

P(X<5) = P(X=0)+ P(X=1)+ P(X=2)+ P(X=3)+ P(X=4)

=0.00307+0.0217+0.0715+0.1457+0.2057= 0.4477

3. Between five and nine. Inclusive.

P(5≤ X ≤9)= P(X=5)+ P(X=6)+ P(X=7)+ P(X=8)+ P(X=9)

=0.0174+0.0476+0.1011+0.1671+0.2130 = 0.5462

4. More than five, but less than 10.

P(5<X<10)= P(X=6)+ P(X=7)+ P(X=8)+ P(X=9)

=0.0174+0.0476+0.1011+0.1671= 0.3332

5. Six or more.

P(X ≥ 6) = 1 - P(X<6)

=1-[P(X=0)+ P(X=1)+ P(X=2)+ P(X=3)+ P(X=4)+ P(X=5)]=1-0.6607=0.3393

6.Mean equals …μ= np =15(0.32) =4.8.…….

7.Variance equals …σ^2 = npq =15(0.32)(0.68) =3.264.…

Q2: Singh et al. (A-7) Looked at the occurrence of retinal capillary hemangiona patients with von hippel - Lindau (VHL) disease. RCH is a benign vascular tumor of the retina. Using a retrospective consecutive case series review, the researchers found that the number of RCH tumor incidents followed a Poisson distribution with λ = 4 tumors per eye for patients with VHL. Using this model.

The probability that in a randomly patient with VHL

1.There will be exactly five occurrences of tumors per eye equals…

(λ = 4): $f(x) = e^{-4}\, 4^x / x!$

P(X=5) = 0.1563

2.There are more than five occurrences of tumors per 2-eyes equals…

(λ = (4)(2)=8) : $f(x) = e^{-8}\, 8^x / x!$

P(X >5)= 1 – P(X≤ 5) = 1- 0.19124 =0.80876

3.There are between five and seven occurrences tumors per eye, inclusive……..

(λ = 4) : $f(x) = e^{-4}\, 4^x / x!$

P(5≤ X ≤ 7) = 0.320

4.The mean (per eye) **= λ =4**

5.The variance (Per 2-eyes) **= λ =(4)(2)=8**