

1. Suppose that you would like to evaluate two new (non-invasive) diagnostic tests (Test  $T_1$  and Test  $T_2$ ) to identify subjects with coronary heart disease. Suppose that the prevalence of coronary heart disease is 5%. The properties of the two diagnostic tests are listed below:

	Test $T_1$	Test $T_2$
Sensitivity	60%	75%
Specificity	95%	90%

- (a) Which one of the two tests will generate a larger number of false positive test results?  
(b) Using Test  $T_1$ , what is the probability that a person with a positive test results actually has a coronary heart disease?
2. Interstitial cystitis (IC) is a condition resulting in recurring discomfort or pain in the bladder or surrounding pelvic region. A new method to detect IC is being developed here. To evaluate this method, 1000 patients known to be IC positive were recruited and 800 patients known to be IC negative were recruited. Each of the 1800 patients was tested with the new method. 867 of the 1000 truly positive patients tested positive; 85 of the 800 truly negative patients tested positive.
- (a) What is the sensitivity of this new method?  
(b) What is the specificity of this new method?  
(c) Using the fact that the prevalence of IC is 0.01, calculate the positive predictive value of the test.

**3. Exercise 3.5.1 Page 83**

A medical research team wishes to assess the usefulness of a certain symptom (call it S) in the diagnosis of a particular disease. In a random sample of 775 patients with the disease, 744 reported having the symptoms. In an independent study random sample of 1380 subjects without the disease, 21 reported that they had the symptoms.

- a) In the context of this exercise, what is a false positive?  
b) What is a false negative?  
c) Compute the sensitivity of the symptoms.  
d) Compute the specificity of the symptoms.  
e) Suppose it is known that the rate of the disease in the general population is 0.001. What is the predicted value positive of the symptoms?  
f) What is the predicted value negative of the symptoms?  
g) Find the predicted value positive and the predicted value negative of the symptoms for the following hypothetical diseases rates: 0.0001, 0.01 and 0.10.  
h) What do you conclude about the predicted value of the symptoms on the basis of the result obtained in part g?