In Class Practice – Screening
March 27th

Problem 1.
To evaluate the performance of a new diagnostic test, the developer checks it out on 100 known cases of the disease for which the test was designed, and on 200 controls known to be free of the disease. Ninety of the cases yield positive tests, as do 30 of the controls. Based on these data, the specificity and false positive error rates of the test are, respectively,

a. 75% and 10%
b. 85% and 10%
c. 85% and 15%
d. 85% and 25%
e. 90% and 15%

	Diseased	No diseased
+	90	30
-	10	170
	100	200

Problem 2.
Test A has 70% sensitivity and 90% specificity. Test B has 90% sensitivity and 80% specificity. Assuming that responses to Tests A and B are statistically independent, determine the sensitivity and specificity of

a. using Test A and Test B in parallel.
b. using Test A and Test B in series, Test A first.
c. using Test A and Test B in series, Test B first.

*a. Sensitivity = 0.7+0.9-(0.7*0.9)= 97%; Specificity = 0.9x0.8 = 72%;*

b. and c. Sensitivity = 0.7x0.9 = 63%;
*Specificity = 0.9+0.8-(0.9*0.8) = 98%;*

Problem 3.
A test with 99.9% sensitivity and 99% specificity is used to screen a population for a disease with 1% prevalence. The proportion of test positives in the screen who actually have the disease will be roughly

9.99	9.9	
0.01	980.1	
10	990	1000

a. 10%
b. 30%
c. 50% or 9.99 /(9.99+9.9)
d. 90%
e. 99%
f. 99.9%

Problem 4.
The American Disease X Foundation reports that 6% of the population over 50 years of age has Disease X. You inquire as to the source of their information, and they cite disease population screening data in the literature which reports that 6% of that population was positive when screened. Referring to the literature, you discover that the screening test used had sensitivity of 95% and specificity of 98%. What proportion of the population over 50 years of age do you think really has the disease?

=0.95x	=0.02 (100-x)	6
		94
x	100-x	100

0.95x+2-0.02x=6
0.93X=4
X=4.3

Problem 5.
Which of the following is not conducive to success of a medical screening program?
a. high incidence
b. long duration of the disease
c. excellent therapeutic results at all stages
d. screening inexpensive
e. high specificity of the test

Problem 6.
The prevalence of colon cancer is 40%. A colonoscopy can test for colon cancer, and it has a sensitivity of 75% and a specificity of 67%. The predictive value positive (PVP) of this test is about ____ and the predictive value negative (PVN) is about _____.

	colon cancer	no colon cancer	
positive test	30	20	50
negative test	10	40	50
	40	60	100

a) 60%; 80%
b) 99%; 65%
c) 75%; 67%
d) 17%; 80%

Problem 7.
Suppose the prevalence of coronary heart disease among older adults is 25%. Angiography can test for CHD, and it has a sensitivity of 60% and a specificity of 80%. The predictive value positive (PVP) of this test is about ____ and the predictive value negative (PVN) is about _____.

	CHD	no CHD	
positive test	15	15	30
negative test	10	60	70
	25	75	100

a) 25%; 14%
b) 50%; 86%
c) 60%; 80%
d) 80%; 50%

Problem 8.
The study consist a sample of 129 only under five children. All the children were clinically diagnosed by both diagnostic procedures as respiratory rate count based & symptom based for ARI. And the parents of the children were interviewed. Calculate percent agreement and simple kappa statistic.

ARI cases diagnosed by two different diagnostic procedures

ARI diagnosed by respiratory rate count	ARI diagnosed by symptom			
		With ARI	Without ARI	Total
	With ARI	17	36	53
	Without ARI	13	63	76
	TOTAL	30	99	129

Percent agreement: (17+63)/129}x100= 62.015%

Expected counts:

12	*41*
18	*58*

Expected agreement = (12+58)/129=54%

Kappa = (62-54)/(100-54)=0.17