Epidemiologic Inference in Public Health I

340.721.81

LiveTalk

February 14, 2018

Overview of LiveTalk

- Review of ***Activity*** on Validity & Reliability
- Announcements about Midterm Exam

  Reminder: Please post to General Chat and we will answer as many questions as possible at the end of the LiveTalk

Announcements

- ***PRE-Activity*** (Surveillance Systems) due to CoursePlus on Wed, Feb 21 by 4:00PM Eastern time
- We will discuss the ***Activity*** on Surveillance Systems at the LiveTalk Wed, Feb 21 4:00-5:30PM Eastern time

Announcements on Midterm Exam

- Opens Thursday, Feb 15 at 12:00am Eastern time
- Closes Saturday, Feb 17 at 11:59pm Eastern time

Midterm Exam

- 20 multiple choice questions
- Closed book/closed note
- To be completed individually in keeping with the Academic Ethics code
- Covers materials through Lecture 12 (Analytic Studies and Clinical Trials) and PRE-Activity/Activity 3 on Validity and Reliability
- 2 hours to complete the exam

Midterm Exam

- Proctored exam
- Passwords to access the Midterm were emailed to Proctors on Monday Feb 12
- It is your responsibility to arrange with your proctor the date and location of the exam

Midterm Exam

- Bring to the exam:
  - Blank paper (for scrap paper)
  - Pen or pencil
  - Calculator (you are not allowed to use the calculator function on your cellphone or tablet. You cannot use Excel or any other computer software.)
  - Laptop computer (if there is not a computer at the testing site)

- At the beginning of the exam, the proctor will use the password to access the exam for you

Midterm Exam

- During the exam:
  - The only application that should be open on your computer is an Internet browser, and the only tab that should be open on that browser is the examination in Courseplus
  - In addition to recording your answers in Courseplus, you should record your answers on scrap paper during the exam, as a precaution in case of technical difficulties
  - Should you experience technical difficulties (e.g., loss of power, loss of internet connectivity), the proctor will need to re-enter the password

Midterm Exam

- At the end of the exam:
  - All exam materials (including scrap paper) must be given to the proctor
  - The proctor must watch you submit your final answers prior to leaving the testing site

- Do not post or discuss the midterm exam questions or answers on the Discussion Forum or with others until the midterm has been returned

- Grades will be distributed by email once all exams (including make-up exams) have been completed

Practice Problems for the Midterm Exam

CoursePlus® 340.721.81 – Epidemiologic Inference in Public Health I 3 2015-2016

Syllabus | Content | Communication | Resources | Help

Content

Current Baltimore Time: Monday, January 18, 2016, 2:03:06 PM

Note: Assignments become accessible on the dates listed in the "Available" column. All assignments are due no later than 11:59 p.m. EST on the date indicated, unless otherwise noted. All times are for Baltimore, Maryland (Eastern United States). Visit http://www.timeanddate.com/worldclock to convert to your local time.

Download the schedule to your calendar

Available	Assignment		Due
Important Links and Assessments			
Tue, Jan 19	Lecture Self-Assessments	Use this link to reach the self-assessments for all lectures	——
Tue, Jan 19	octor	Identify a Proctor in CoursePlus	Mon, Feb 1, 11:59 PM
Tue,	LiveTalks and Archived		——

Practice Problems for the Exams can be accessed using this link

Review for the Midterm Exam

- Slides and audio recording of a review for the Midterm Exam presented during another section of this course are available in the Online Library on Courseplus
- Materials covered in this course and in that course are very similar
  - Ignore slides 1-21 (announcements for the prior course)
  - Relevant audio starts at ~15:50

Tracking Online Activity during the Exam

- From the course syllabus:

Tracking of Your Activity When Taking Online Quizzes/Exams in CoursePlus

CoursePlus tracks your browsing activity any time you are logged into CoursePlus. This includes when you take quizzes or exams. While you take quizzes or exams, CoursePlus tracks any time you switch away from or back to the quiz or exam page. It also tracks your access of other web pages or content in the course website while taking the quiz or exam. Faculty have access to per-student logs which show all this information. Switching away from the exam page, whether or not to access other course content, while taking a closed-book, online exam (i.e., a quiz/exam which does not allow use of course materials or any other outside sources to complete the quiz/exam) may constitute an academic ethics violation, even if you do not intend to access materials relevant to completing the exam or quiz.

Some students ask if they may copy answers into a Word document in case they lose Internet connectivity during an exam. There is no need to do this. Your answers are automatically saved in the background as you work. If you are logged out from CoursePlus during an exam, all your answers will be saved as soon as you log back in. So do NOT do this – the log of your activity may record this as impermissibly leaving a closed-book exam.

Review of *Activity*

Validity and Reliability

Plan for today

- We will review the answers to the ***Activity*** question by question
- Questions were assigned to Groups last week
- When it's time for your group to present, if you are the spokesperson for your group, please raise your hand and we will call on you to answer your assigned questions

Activity : Validity and Reliability

Concepts covered:

- Validity: Sensitivity (SEN) and Specificity (SPE)
- Predictive values: Positive Predictive Value (PPV) and Negative Predictive Value (NPV)
- Determining cut-off points for defining positive and negative tests
- Reliability

Activity : Validity and Reliability

- Purpose: to develop an understanding of key concepts related to validity and reliability. We will use diagnostic and screening tests to illustrate these concepts.
- We calculate SEN, SPE, PPV, and NPV.
- We study the relationships among these measures and calculate net SEN and net SPE to examine the effects of sequential testing (e.g., one test is administered to everyone, and then people who test positive are given a second test).
- We also calculate percent agreement and percent positive agreement.

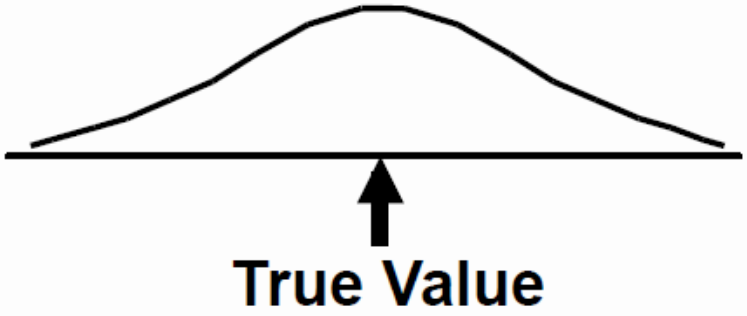
Question 1 (Group 11)

Compare and contrast validity and reliability

Validity vs. Reliability

Valid Test Results

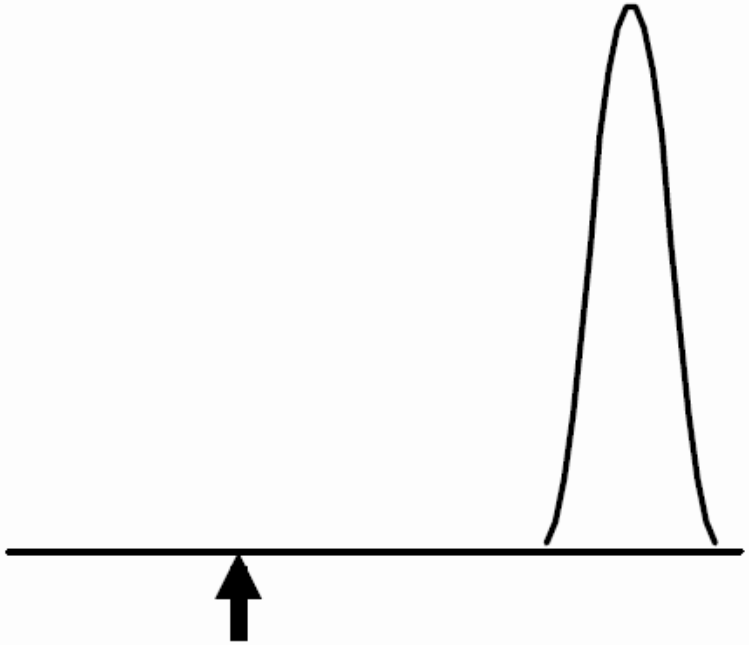
- *Are the results correct?*



- Accuracy
- Sensitivity, specificity

Reliable Test Results

- Are the results repeatable?



- Precision
- Percent agreement, Percent positive agreement, Kappa statistic

Question 2 (Group 11)

Suppose the sensitivity of the nurse's test to detect (preclinical) heart disease in school children is 80%. Suppose that the specificity of the test is also 80%. How would you explain the sensitivity and specificity of the nurse' test to the parents of the children?

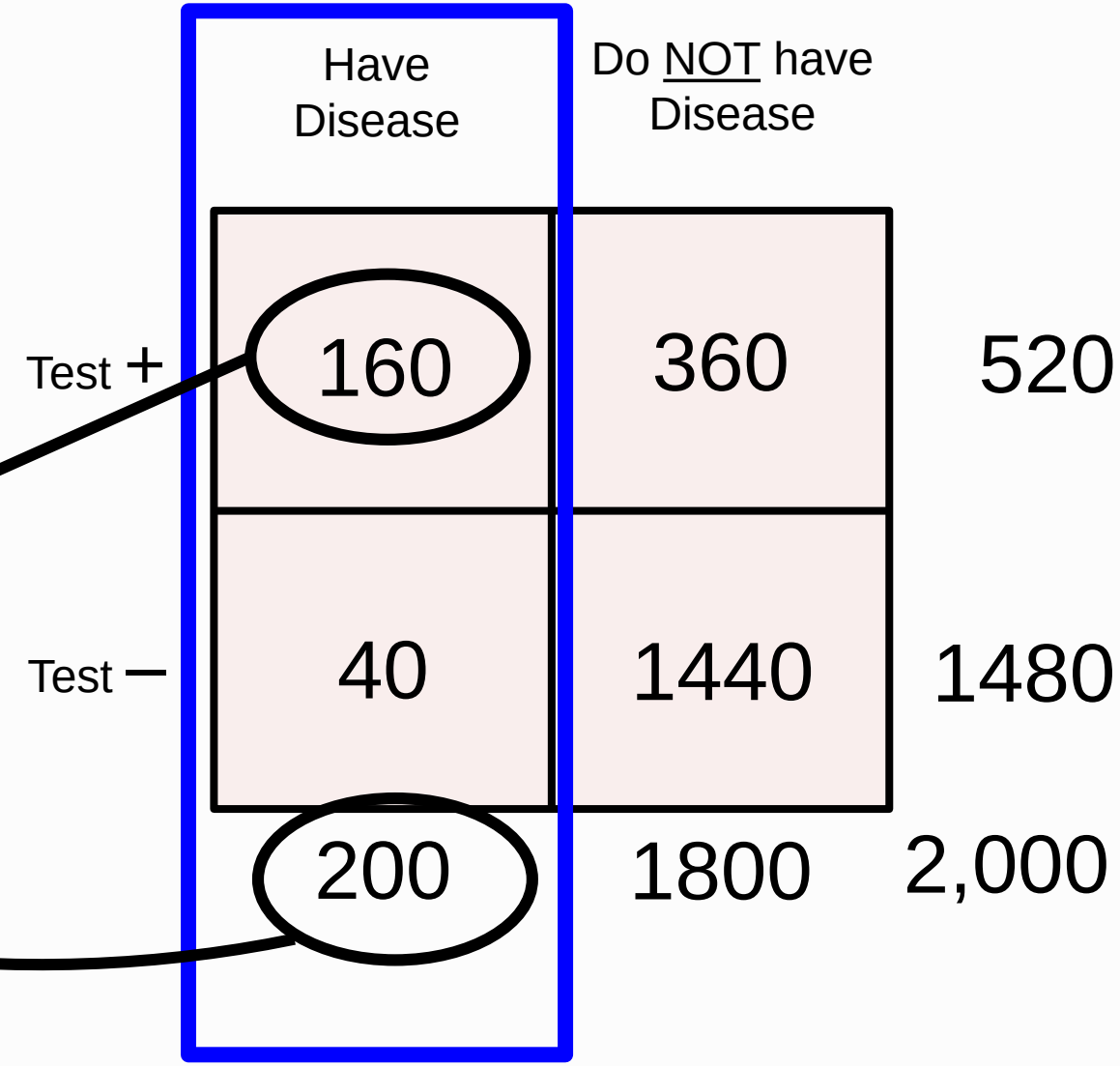
Question 2

Sensitivity measures the probability that an individual with the disease will be correctly identified as having the disease

Specificity measures the probability that an individual without disease will be correctly Identified as not having the disease

- **Sensitivity** =

the ability of the test to correctly identify individuals who have the disease

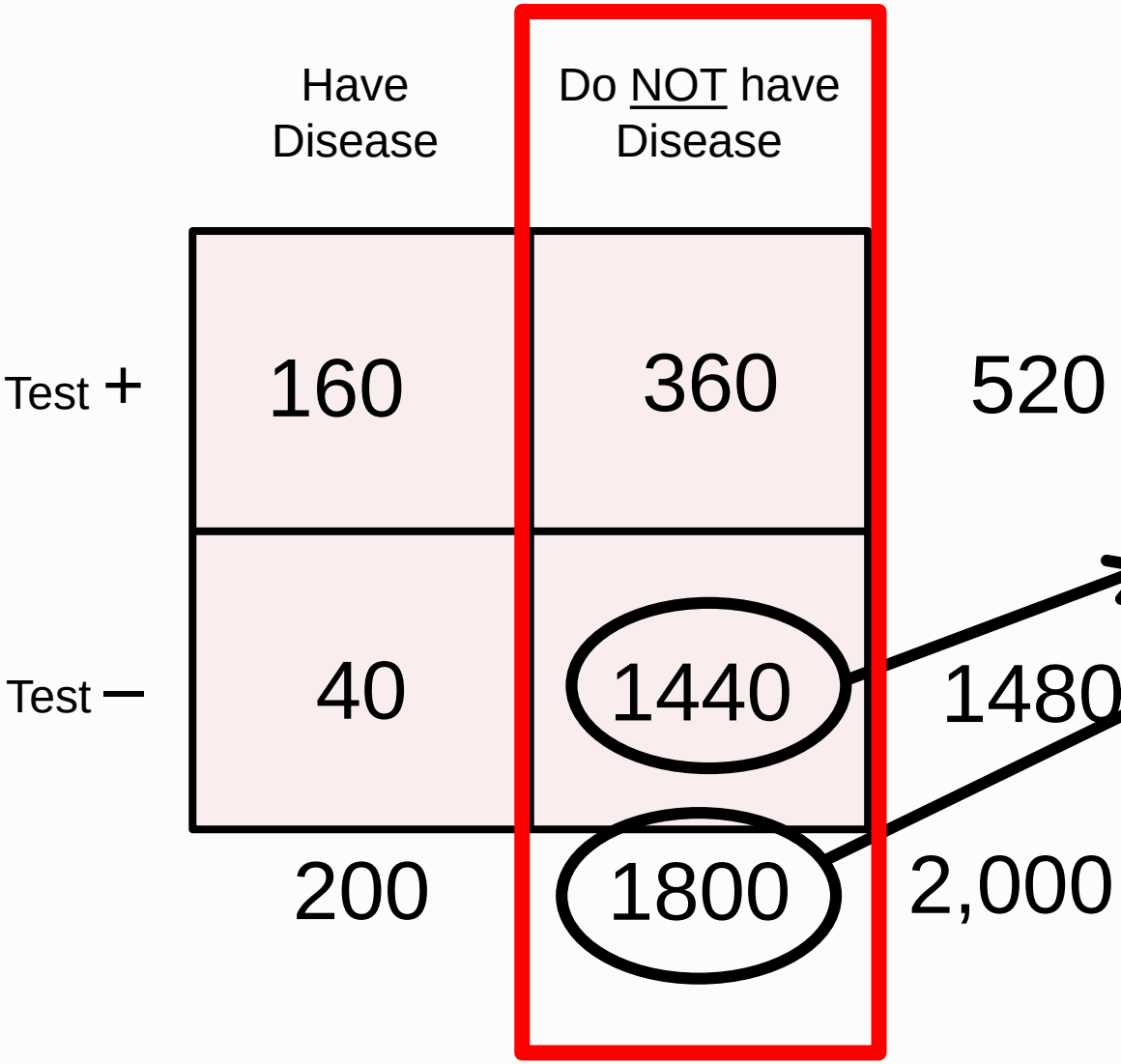


- **Sensitivity** =

$$\frac{160}{200} = 0.80 = 80\%$$

- **Specificity =**

the ability of the test to correctly identify individuals who do NOT have the disease



- **Specificity =**

$$\frac{1440}{1800} = 0.80 = 80\%$$

	Have Disease	Do NOT have Disease
Test Positive	**True Positive (TP):** Have disease & test positive	**False Positive (FP):** Do NOT have disease but test positive
Test Negative	**False Negative (FN):** Have disease but test negative	**True Negative (TN):** Do NOT have disease & test negative

$$\text{Sensitivity} = \frac{TP}{TP + FN} \qquad \text{Specificity} = \frac{TN}{TN + FP}$$

Key Points

- Sensitivity & Specificity are:
  - Measures of ***validity***
  - Fixed characteristics of a test

Question 3 (Group 8)

Suppose that the positive predictive value of the nurse's test is 48% and the negative predictive value is 95%. How would you explain the positive predictive value of the nurse' test to the parents of the children? The negative predictive value?

Question 3

Positive predictive value (PPV) is the probability that a person with a positive test does have the disease

Negative predictive value (NPV) is the probability that a person with a negative test does NOT have the disease

Recall…from the PRE-Activity

Question 5

Based on the information provided in the PRE-Activity, what is the *positive predictive value* (PPV) of the school nurse's examination? (The PPV can be calculated from the completed 2x2 table below or using the formula above.)

Nurse's Diagnosis	Heart Disease: Yes	Heart Disease: No	Total
Yes			
No			
Total			2000

a. 31%

b. 35%

c. 52%

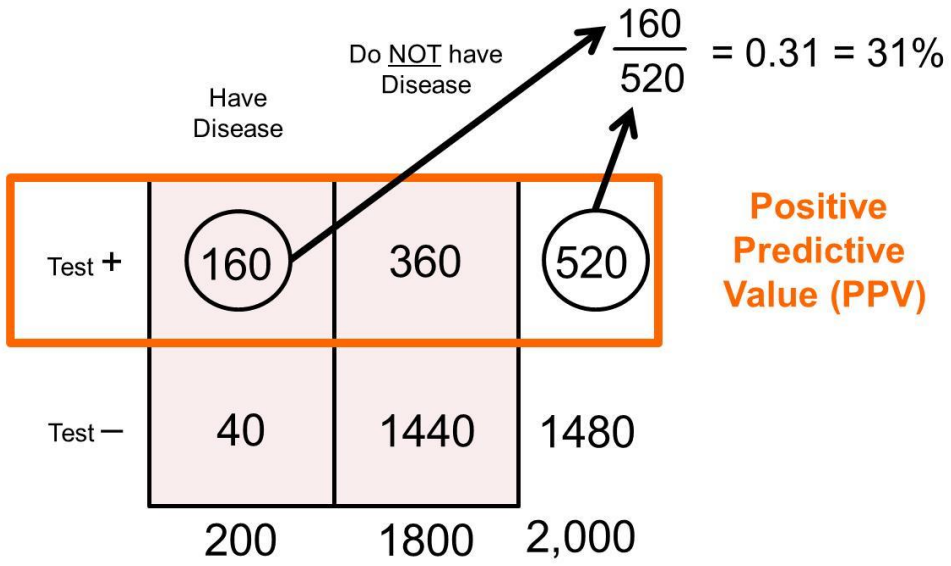
d. 98%

Recall…from the PRE-Activity

Question 5

Based on the information provided in the PRE-Activity, what is the *positive predictive value* (PPV) of the school nurse's examination? (The PPV can be calculated from the completed 2x2 table below or using the formula above.)

Nurse's Diagnosis	Heart Disease: Yes	Heart Disease: No	Total
Yes			
No			
Total			



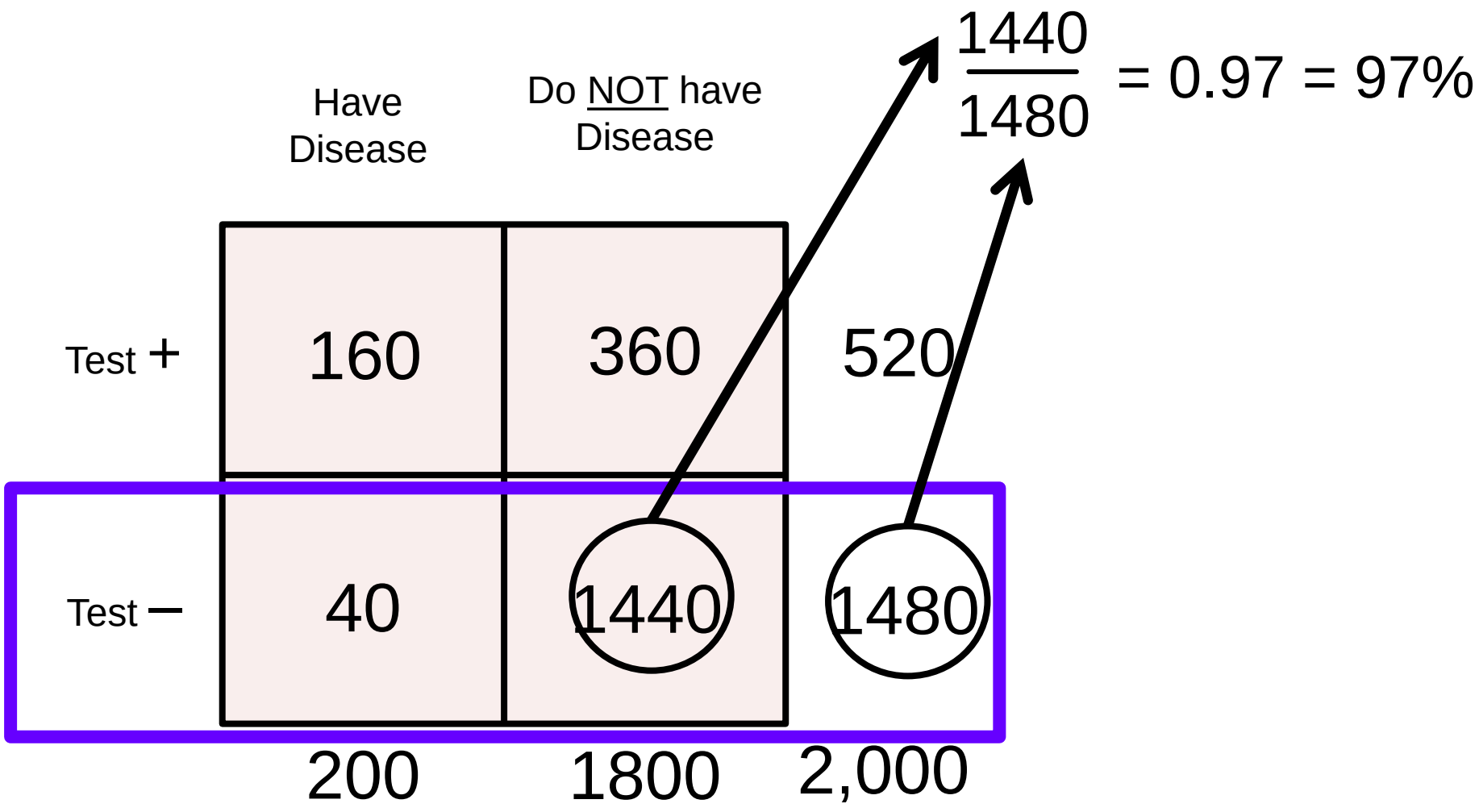
a. 31%

b. 35%

c. 52%

d. 98%

Negative Predictive Value (NPV)



Validity – down the columns

Sensitivity Specificity

Predictive Value – across the rows

	Have Disease	Do NOT have Disease	
Test +	160	360	520
Test –	40	1440	1480
	200	1800	2,000

Positive Predictive Value (PPV)

Negative Predictive Value (NPV)

Poll

How would you explain the positive predictive value of the physician's examination to the parents of the children?

a. If your child tests positive there is an 80% chance that your child has preclinical heart disease

b. 80% of children who test positive have preclinical heart disease

Poll

How would you explain the positive predictive value of the physician's examination to the parents of the children?

a. If your child tests positive there is an 80% chance that your child has preclinical heart disease

b. 80% of children who test positive have preclinical heart disease

Key Point

- PPV and NPV are important for the patient

Question 4 (Group 8)

In the PRE-Activity, the positive predictive value (PPV) of the physician's test was greater than the PPV of the nurse's test. Why are the two positive predictive values different?

[HINT: Consider the example in Table 1.]

Table 1. Prevalence of Human Immunodeficiency Virus (HIV) in Different Populations and the Validity and Predictive Value of Two Tests (Test 1 and Test 2) to Screen for HIV in these Populations

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 1: Sensitivity=99% & Specificity=99%					
Red Cross, First Time Donors	99%	99%	0.015%	2%	100%
Injection Drug Users in NYC	99%	99%	4.3%	82%	100%
MSM in Baltimore	99%	99%	8.5%	90%	100%
Adults in Botswana	99%	99%	37.0%	98%	99%
Test 2: Sensitivity=90% & Specificity=90%					
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MSM in Baltimore	90%	90%	8.5%	46%	99%
Adults in Botswana	90%	90%	37.0%	84%	94%

Abbreviations: MSM, men who have sex with men

Given the information in the table, how do the positive and negative predictive values change when the prevalence of the disease increases?
In a population with a given disease prevalence, what happens to the positive predictive value if a test with higher sensitivity and specificity is used?
What about the effect on negative predictive value?]

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Prevalence ↑ as we move down the column.

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PPV also ↑ as we move down the column.

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As prevalence ↑, so does PPV.

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What about NPV?

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Recall…

- Sensitivity & Specificity are:
  - Measures of validity
  - Fixed characteristics of a test

Sensitivity and specificity do not depend on prevalence, but predictive values (especially PPV) do.

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If we want to know what happens to PPV when specificity changes (*independent* of sensitivity), we need to compare PPV when we change specificity, holding sensitivity constant…

Recall…from the Measuring Disease Frequency PRE-Activity

Table 1:

Quintiles of Serum Cholesterol, Diastolic Blood Pressure (DBP), Smoking Status, and Six-Year CHD Mortality Per Thousand Men at Risk for 356,222 Primary Screenees of MRFIT*

Quintile	Serum Cholesterol, mg/dL (mmol/L)	DBP <90 mm Hg			DBP>90 mm Hg			Total		
		No. of Deaths	No. of Men	Mortality Rate Per 1,000 men at risk	No. of Deaths	No. of Men	Mortality Rate Per 1,000 men at risk	No. of Deaths	No. of Men	Mortality Rate Per 1,000 men at risk
					Non-Smokers					
1	≤181 (≤4.68)	47	35,741	1.6	36	9,612	3.7	83	45,353	2.1
2	182-202 (4.71-5.22)	82	34,553	2.5	51	11,599	4.0	133	46,152	2.9
3	203-220 (5.25-5.69)	87	31,939	2.7	80	12,839	5.6	167	44,778	3.5
4	221-244 (5.72-6.31)	126	30,431	3.8	94	14,500	5.6	220	44,931	4.4
5	≥245 (≥6.34)	188	26,996	6.4	200	16,930	10.7	388	43,926	8.0
Total		**530**	**159,660**	**?**	**461**	**65,480**	**6.4**	**991**	**225,140**	**4.3**
					Smokers					
1	≤181 (≤4.68)	82	20,017	5.2	31	5,002	6.3	113	25,019	5.4
2	182-202 (4.71-5.22)	95	19,675	5.5	60	5,977	10.0	155	25,652	6.7
3	203-220 (5.25-5.69)	128	18,812	7.3	100	6,397	15.5	228	25,209	9.5
4	221-244 (5.72-6.31)	186	19,119	10.2	127	7,533	16.6	313	26,652	12.1
5	≥245 (≥6.34)	250	18,907	13.3	208	9,643	21.4	458	28,550	16.0
Total		**741**	**96,530**	**8.4**	**526**	**34,552**	**15.1**	**1,267**	**131,082**	**10.3**
					All Men					
1	≤181 (≤4.68)	129	55,758	2.8	67	14,614	4.6	196	70,372	3.2
2	182-202 (4.71-5.22)	177	54,228	3.5	111	17,576	6.0	288	71,804	4.2
3	203-220 (5.25-5.69)	215	50,751	4.3						
4	221-244 (5.72-6.31)	312	49,550	6.2						
5	≥245 (≥6.34)	438	45,903	9.1						
Total		**1,271**	**256,190**	**5.2**						

* DBP Indicates Diastolic Blood Pressure; CHD, Coronary Heart Disease; Trial. Analysis is Age Standardized.

By focusing on participants that are in a range that is considered normal for the other risk factors you can *separate* the effect for a single risk factor. **Participants that are non-smokers, have a diastolic blood pressure (DBP) below 90 mm Hg, and a serum cholesterol below 200 mg/dL are considered normal.** Therefore to examine the effect of cholesterol on mortality independent (i.e., separate from) smoking and DBP we would focus on the mortality rates for non-smokers with a DBP<90 mmHg: 1.6 (lowest quintile), 2.5 (2nd quintile), 2.7 (3rd quintile), 3.8 (4th quintile) and 6.4 (5th quintile) and see that mortality increases with increasing cholesterol category.

Recall…from lecture

Assume Prevalence=20% and Sensitivity=50%:

- Specificity = 50%

	Disease	No Disease	Totals
Test Positive	100	400	500
Test Negative	100	400	500
Totals	200	800	1,000

$$PPV = \frac{100}{500} = 20\%$$

VS.

- Specificity = 90%

	Disease	No Disease	Totals
Test Positive	100	80	180
Test Negative	100	720	820
Totals	200	800	1,000

$$PPV = \frac{100}{180} = 56\%$$

Recall…from lecture

Assume Prevalence=20% and Sensitivity=50%):

- Specificity = 50%

	Disease	No Disease	Totals
Test Positive	100	400	500
Test Negative	100	400	500
Totals	200	800	1,000

$$PPV = \frac{100}{500} = 20\%$$

VS.

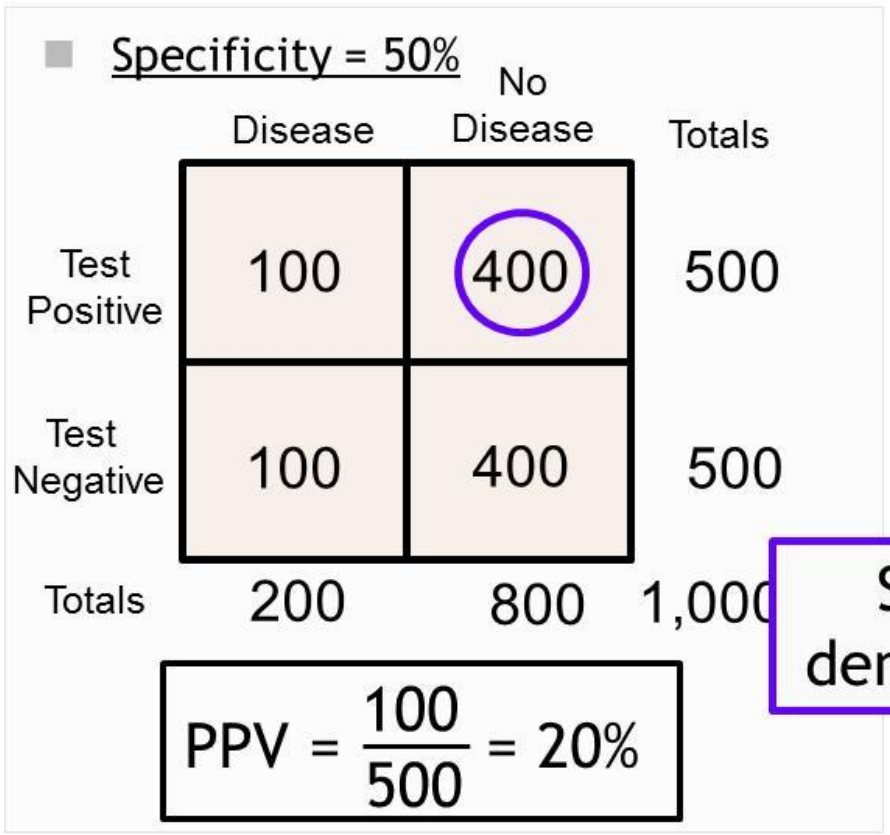
- Specificity = 90%

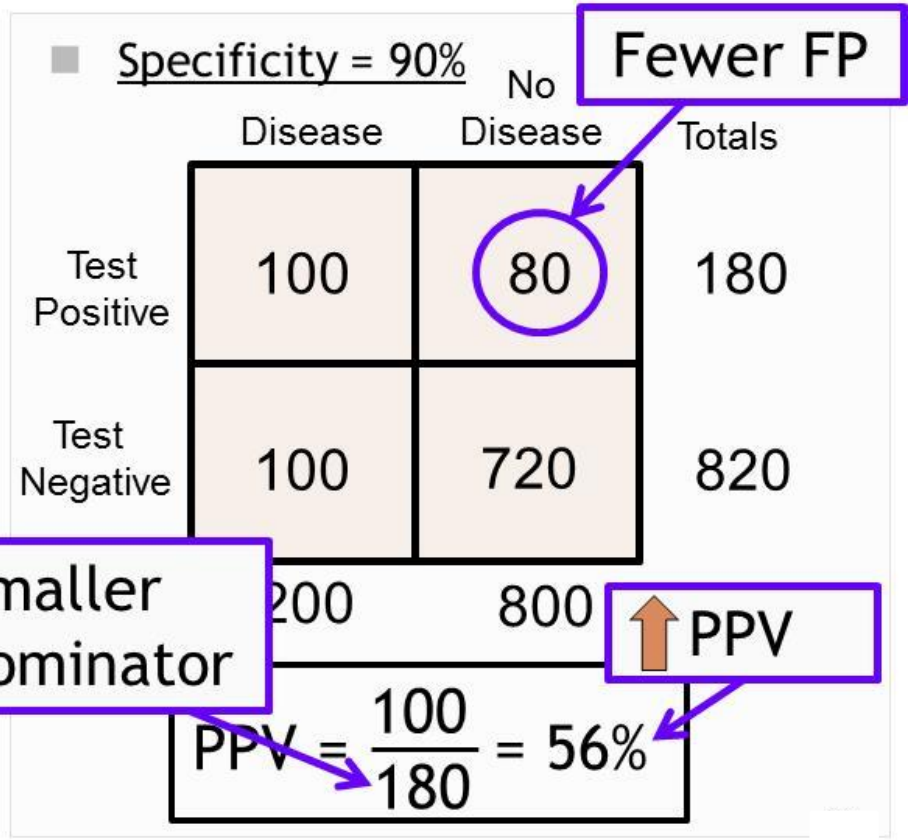
	Disease	No Disease	Totals
Test Positive	100	80	180
Test Negative	100	720	820
Totals	200	800	1,000

$$PPV = \frac{100}{180} = 56\%$$

Recall…from lecture

Assume Prevalence=20% and Sensitivity=50%:





Key Point

- The PPV primarily depends on the:
  - ✓ ***Prevalence*** of the disease in the population tested

    and
  - ✓ ***Specificity*** of the test

Question 4

In the PRE-Activity, the positive predictive value (PPV) of the physician's test was greater than the PPV of the nurse's test. Why are the two PPVs different?

So why is the

physician's test PPV > nurse's test PPV?

1. Nurse's test:

80% sensitivity; 80% specificity

	Have Disease	Do NOT have Disease	
Test +	160	360	520
Test −	40	1440	1480
	200	1800	2000

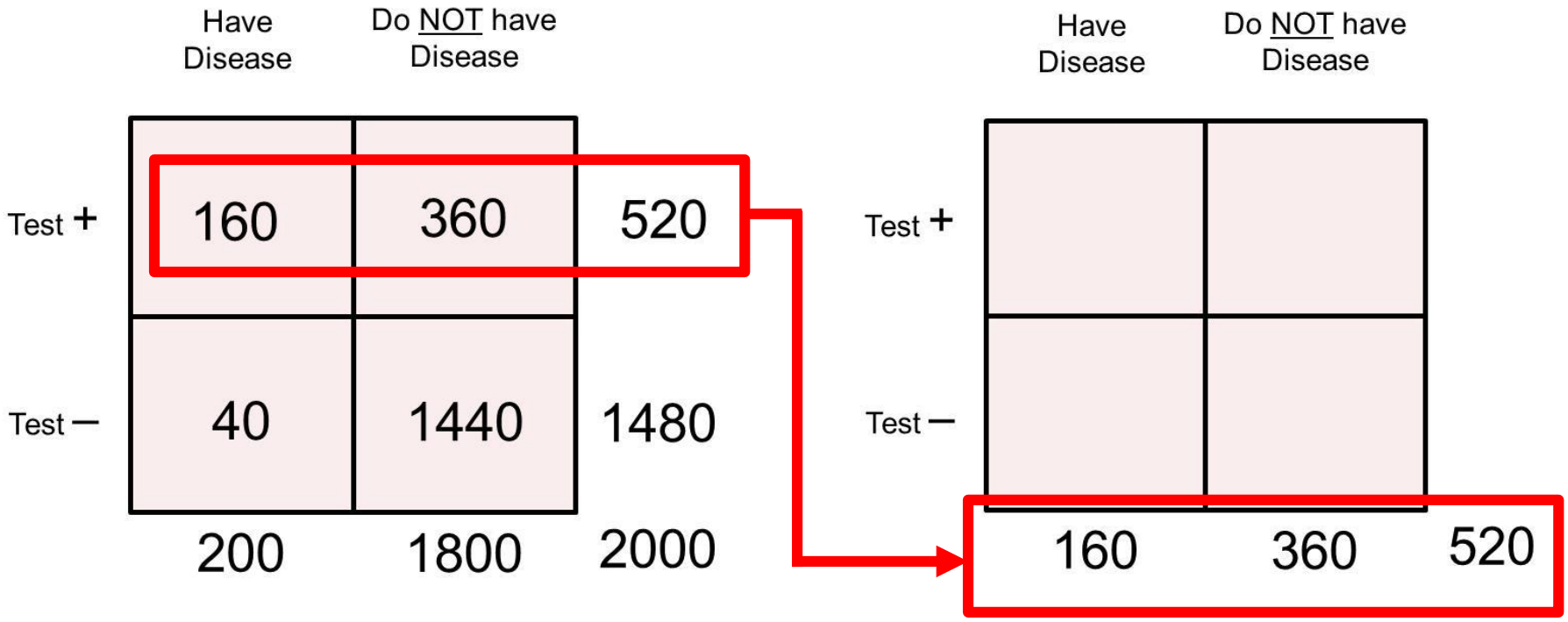
1. Nurse's test:

80% sensitivity; 80% specificity

then

2. Physician's test:

90% sensitivity; 90% specificity



1. Nurse's test:

80% sensitivity; 80% specificity

	Have Disease	Do NOT have Disease	
Test +	160	360	520
Test −	40	1440	1480
	200	1800	2000

then

2. Physician's test:

90% sensitivity; 90% specificity

	Have Disease	Do NOT have Disease	
Test +			
Test −			
	160	360	520

$$\text{Prevalence}_{\text{Nurse}} = \frac{200}{2000} = \mathbf{10\%}$$

$$\text{Prevalence}_{\text{Physician}} = \frac{160}{520} = \mathbf{31\%}$$

1. Nurse's test:

80% sensitivity; 80% specificity

	Have Disease	Do NOT have Disease	
Test +	160	360	520
Test −	40	1440	1480
	200	1800	2000

then

2. Physician's test:

90% sensitivity; 90% specificity

	Have Disease	Do NOT have Disease	
Test +			
Test −			
	160	360	520

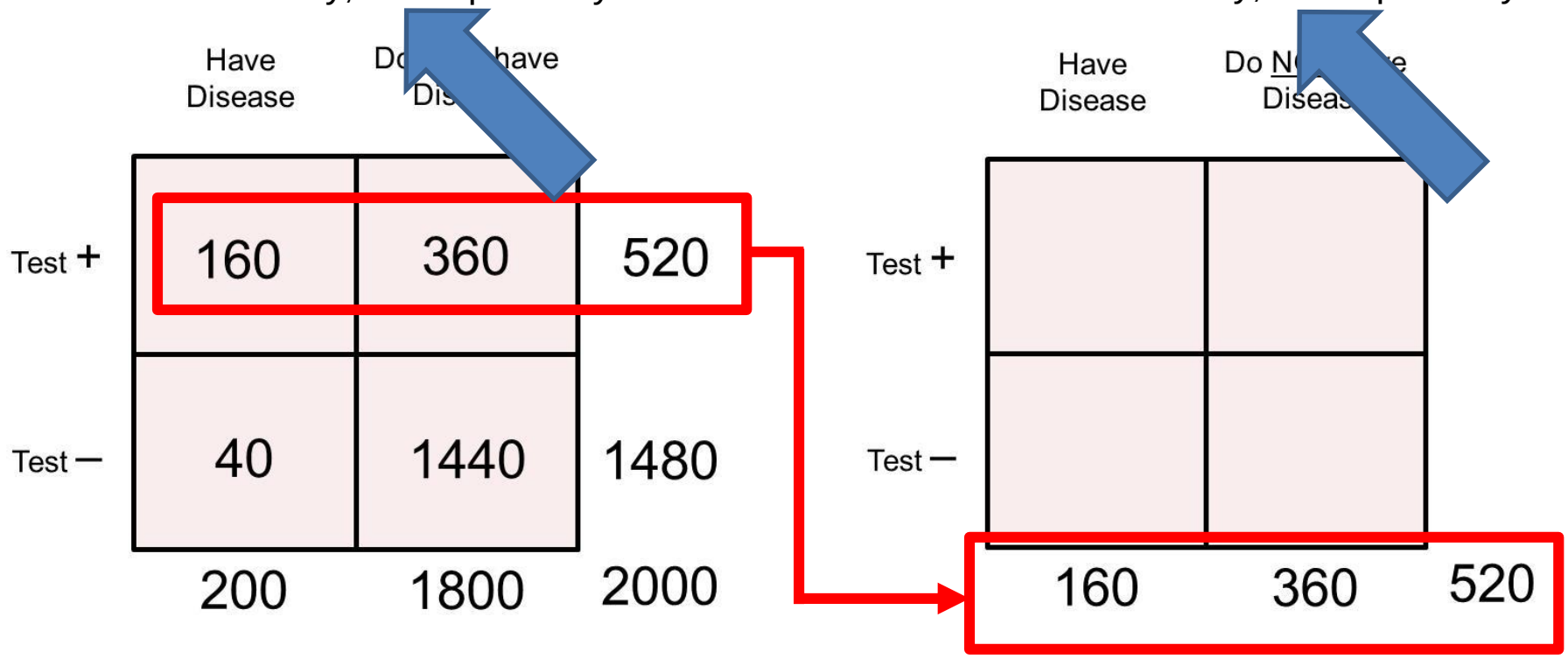
$$\text{Prevalence}_{\text{Nurse}} = \frac{200}{2000} = \mathbf{10\%}$$

$$\text{Prevalence}_{\text{Physician}} = \frac{160}{520} = \mathbf{31\%}$$

1. **Nurse's test:** then 2. **Physician's test:**

80% sensitivity; 80% specificity

90% sensitivity; 90% specificity



$$\text{Prevalence}_{\text{Nurse}} = \frac{200}{2000} = \mathbf{10\%}$$

$$\text{Prevalence}_{\text{Physician}} = \frac{160}{520} = \mathbf{31\%}$$

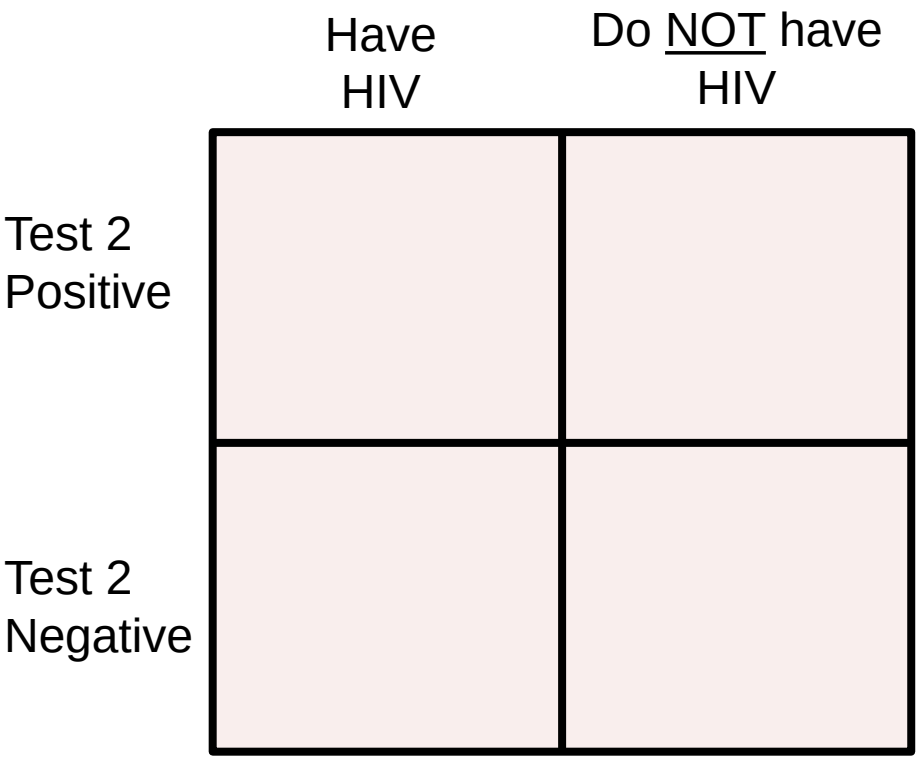
Question 5 (Group 43)

a. In Table 1, the PPV and NPV for Test 2 in Adults in Botswana were 84% and 94%, respectively. Use a 2x2 table to demonstrate how these predictive values were derived.

[*Hint:* To get started, assume a large study population (e.g., n=100,000)].

Question 5

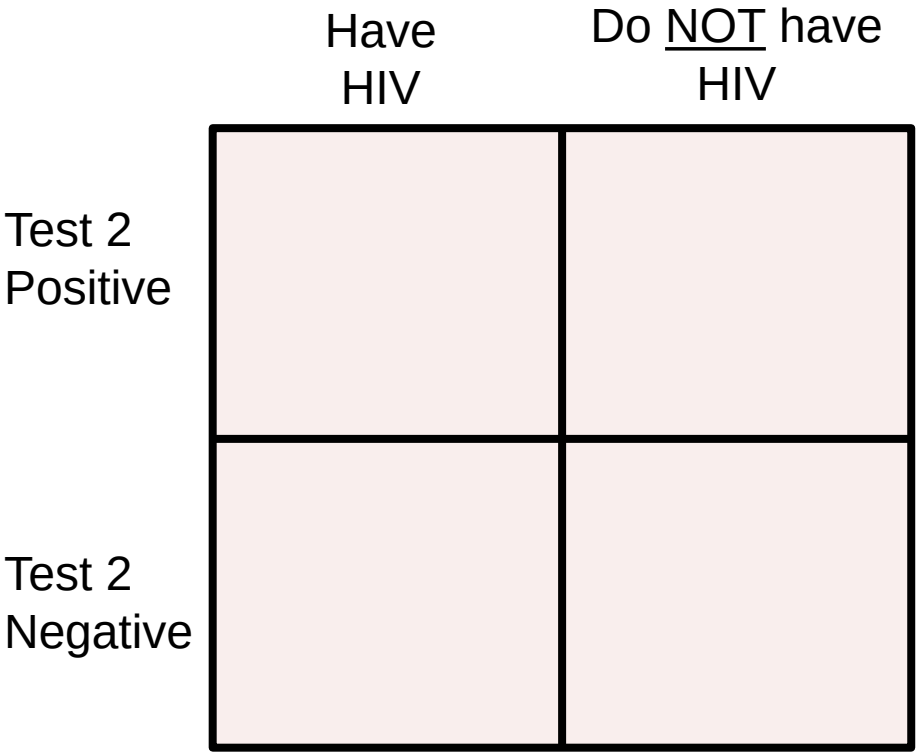
[*Hint:* To get started, assume a large study population (e.g., n=100,000)].



100,000

Question 5

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 2: Sensitivity=90% & Specificity=90%					
Red Cross, First Time Donors	90%	90%	0.015%	0.1%	100%
Injection Drug Users in NYC	90%	90%	4.3%	29%	100%
MSM in Baltimore	90%	90%	[illegible]	46%	99%
Adults in Botswana	90%	90%	37.0%	84%	94%



100,000

Question 5

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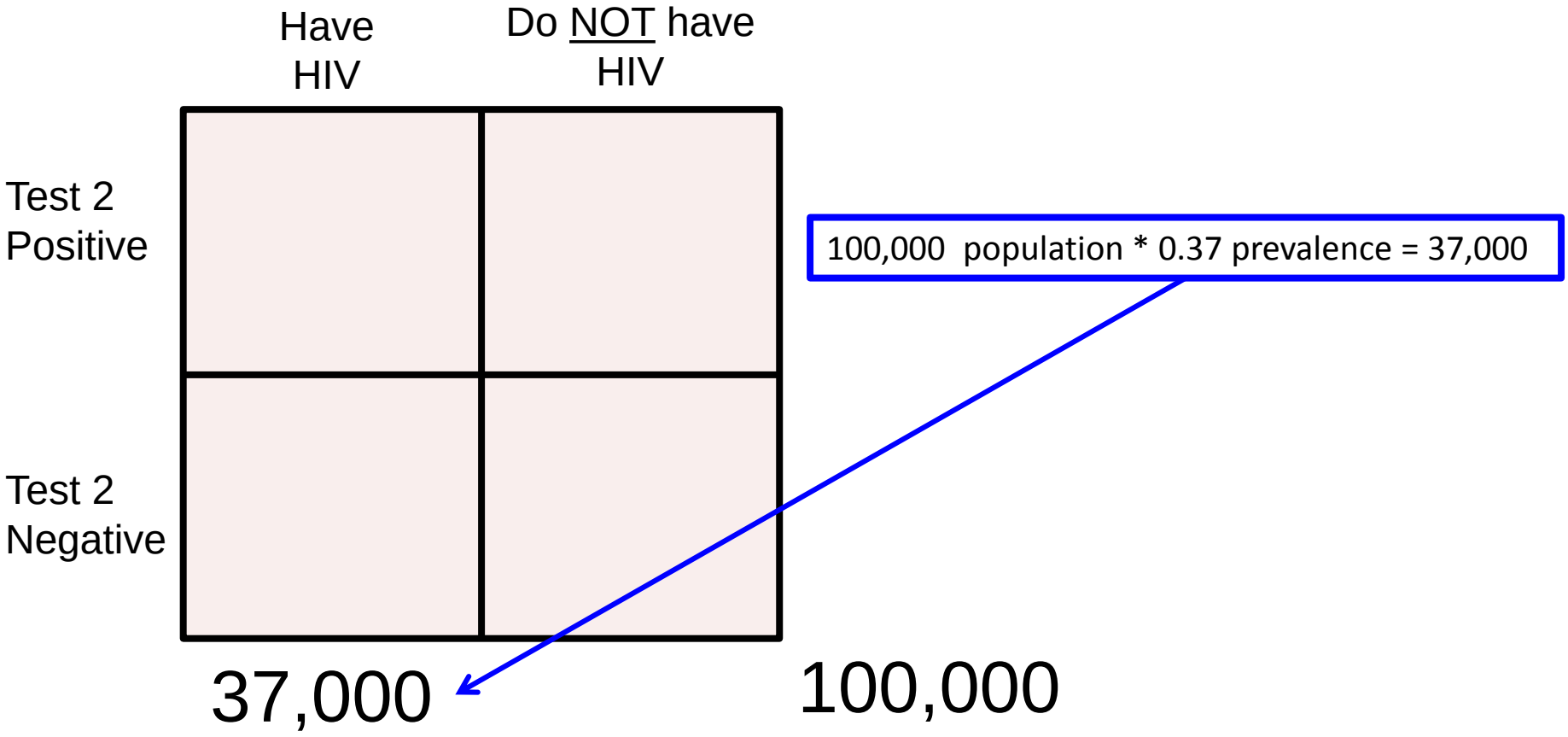

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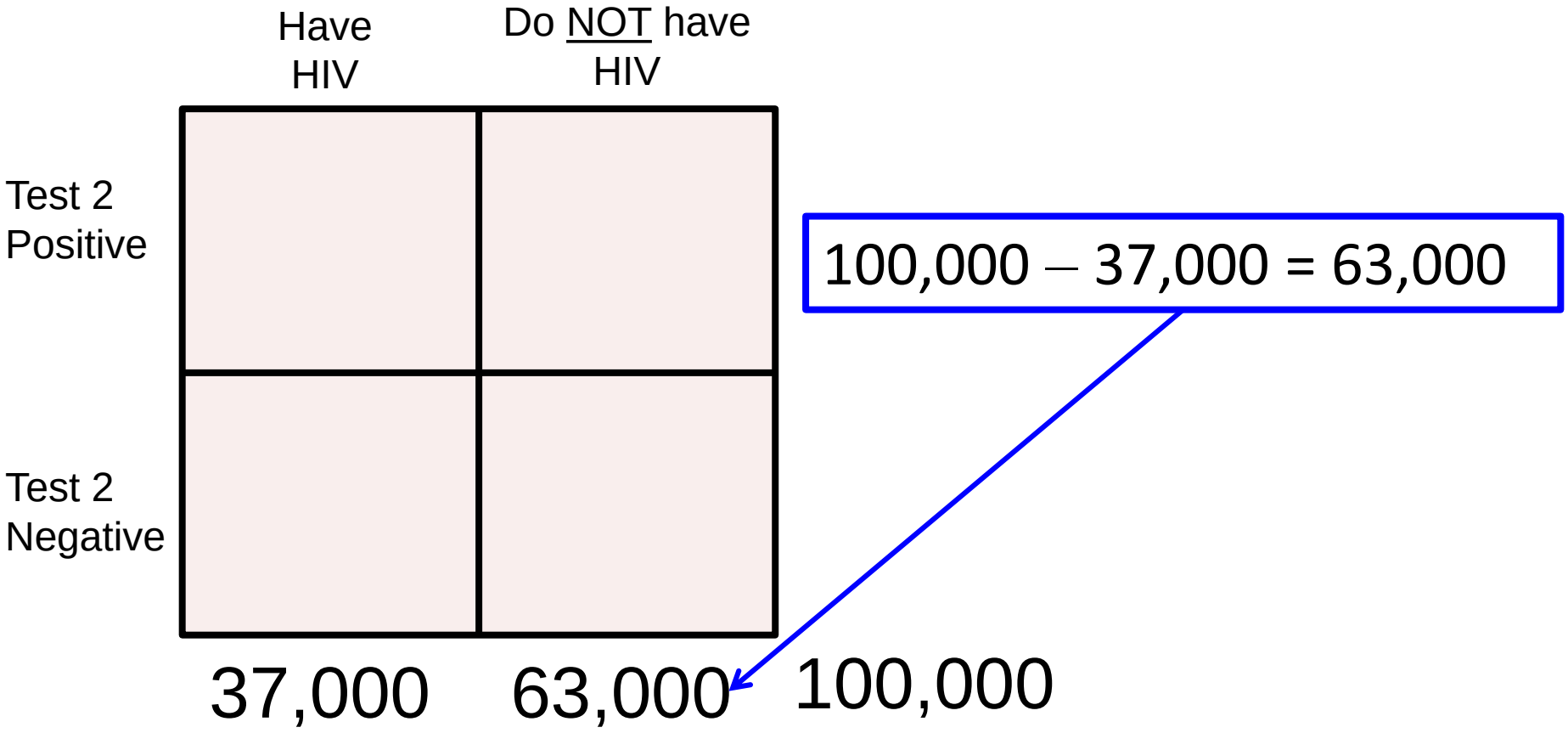

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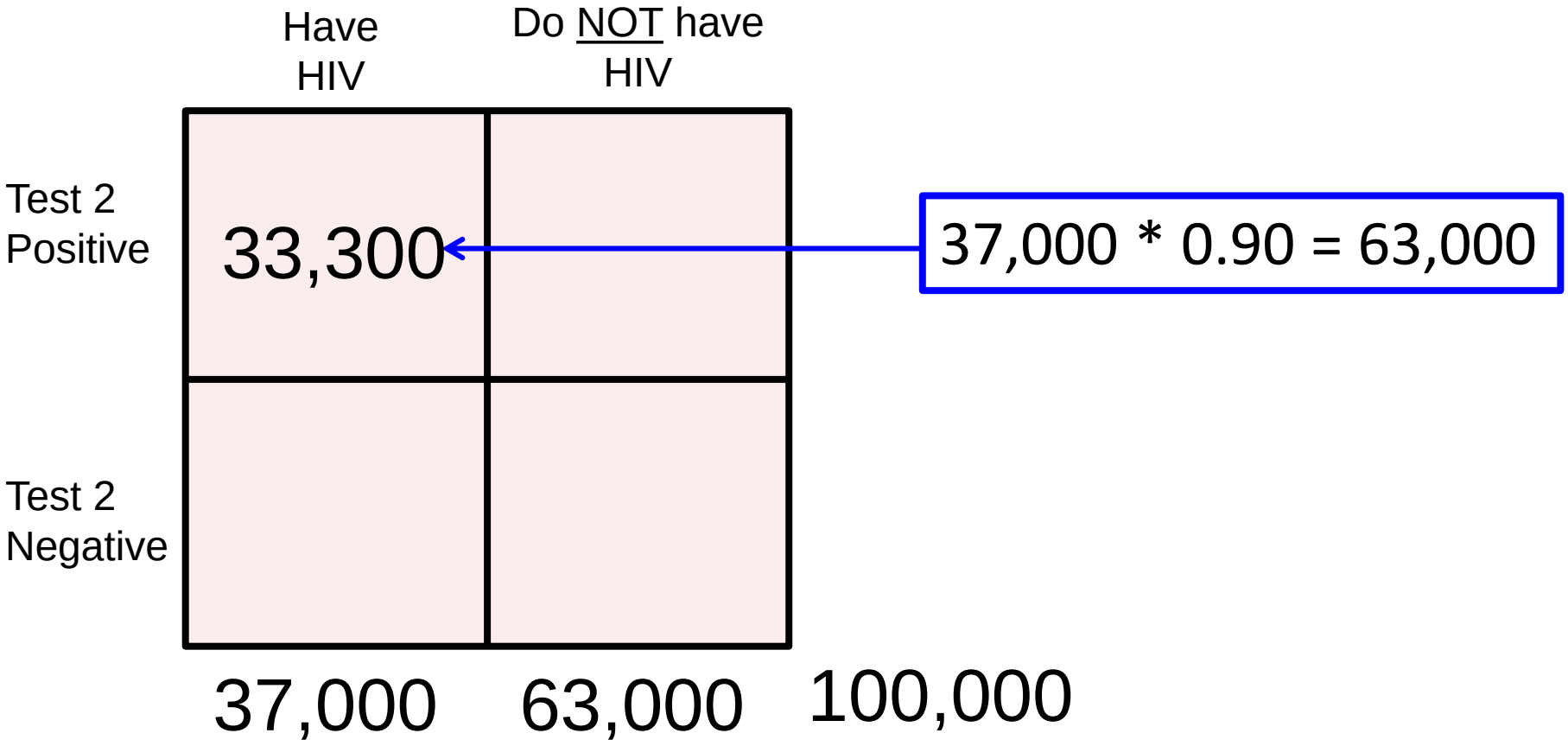

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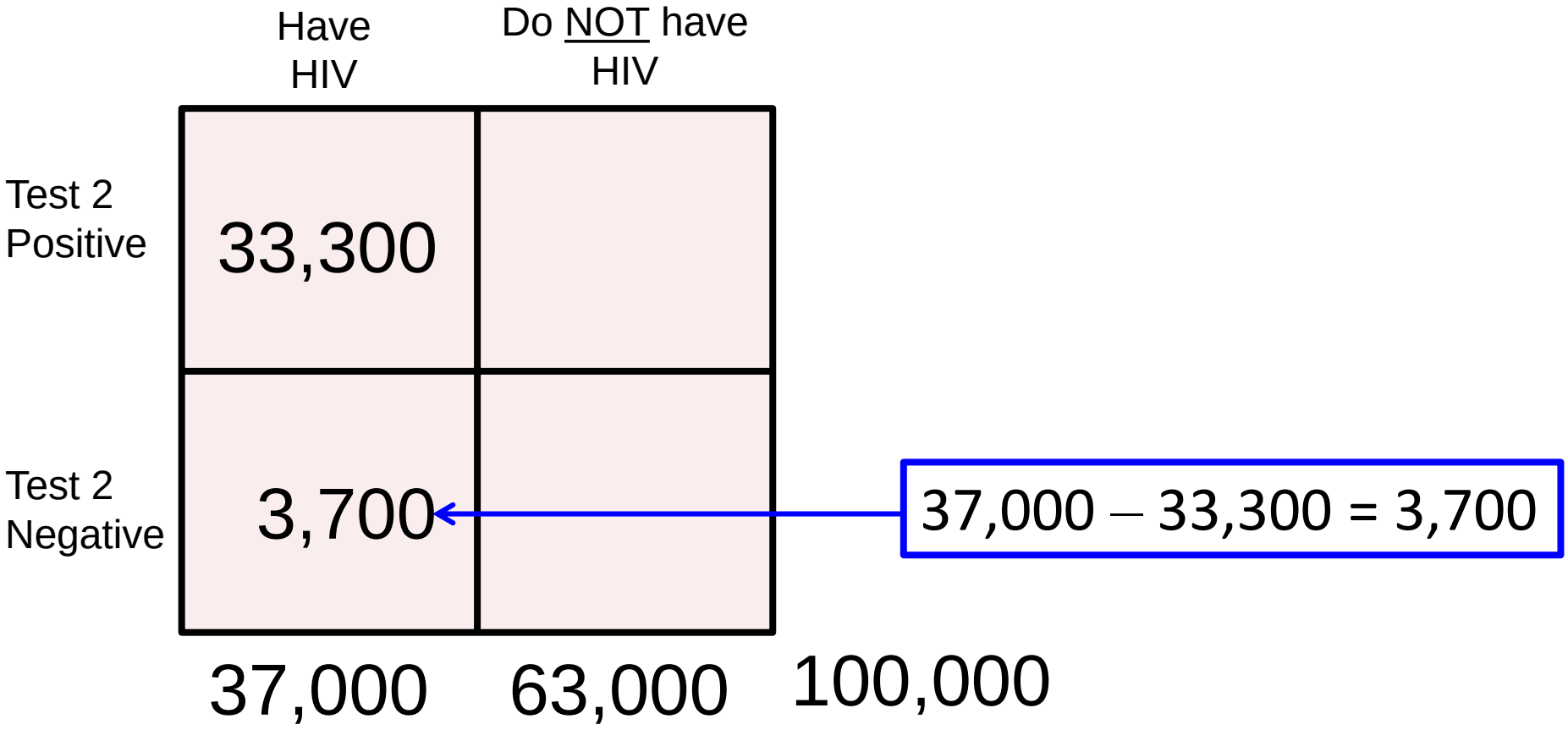

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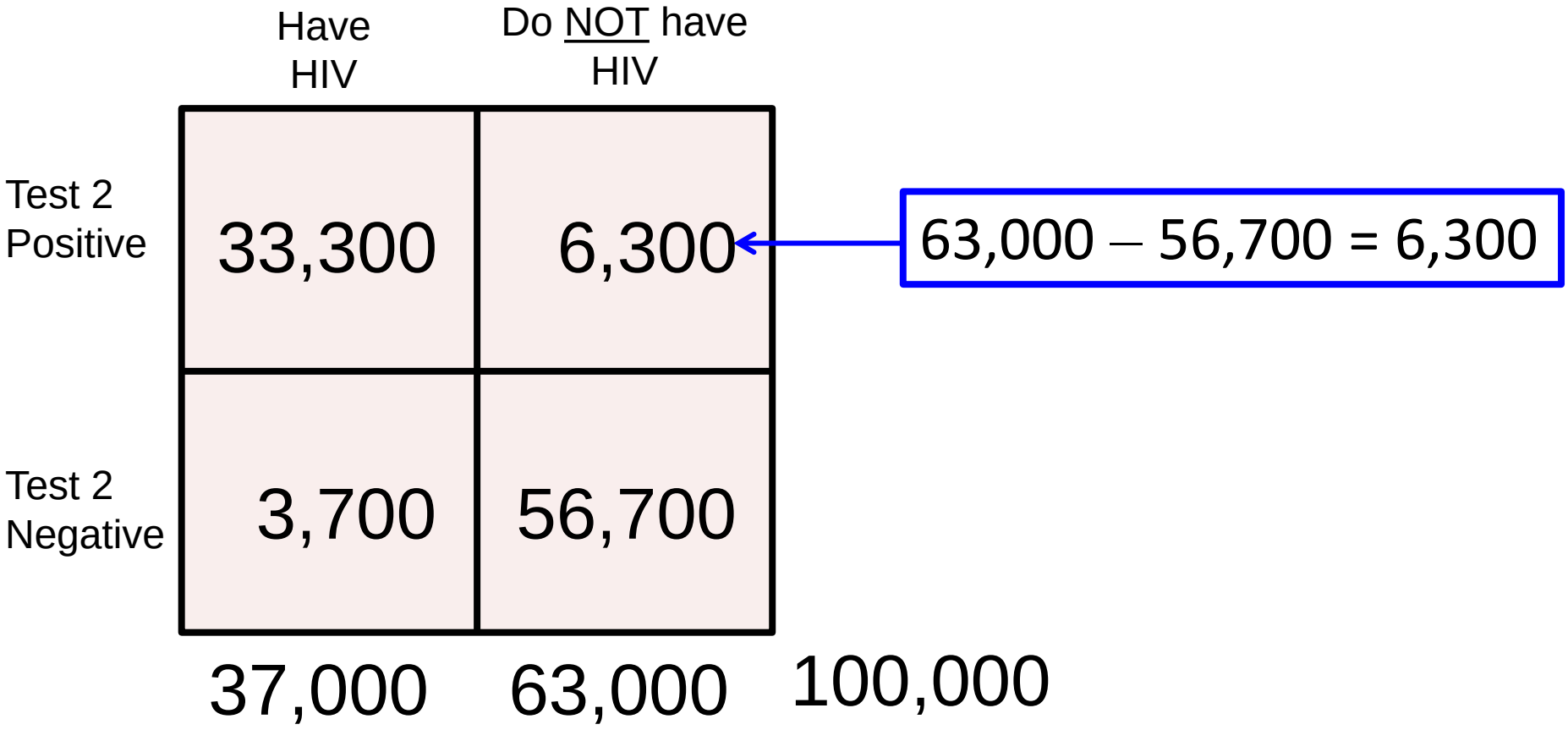

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Adults in Botswana	90%	90%	37.0%	84%	94%

	Have HIV	Do NOT have HIV	
Test 2 Positive	33,300	+ 6,300	= 39,600
Test 2 Negative	3,700	+ 56,700	= 60,400
	37,000	63,000	100,000

Question 5

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 2: Sensitivity=90% & Specificity=90%					
Red Cross, First Time Donors	90%	90%	0.015%	0.1%	100%
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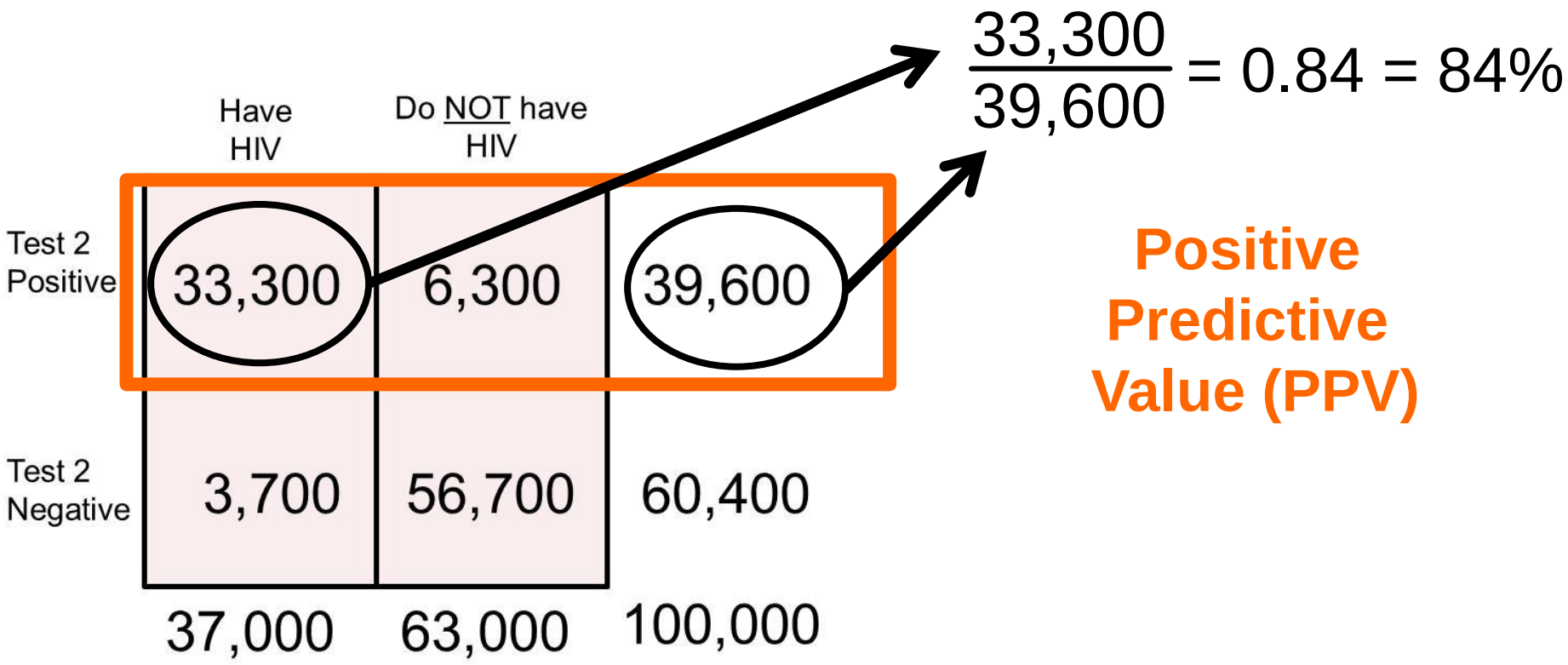

Question 5

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 2: Sensitivity=90% & Specificity=90%					
Red Cross, First Time Donors	90%	90%	0.015%	0.1%	
Injection Drug Users in NYC	90%	90%	4.3%	29%	
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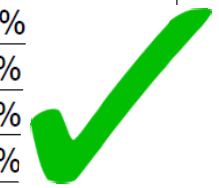

$$\frac{33{,}300}{39{,}600} = 0.84 = 84\%$$

	Have HIV	Do NOT have HIV	
Test 2 Positive	33,300	6,300	39,600
Test 2 Negative	3,700	56,700	60,400
	37,000	63,000	100,000

Positive Predictive Value (PPV)

Question 5

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 2: Sensitivity=90% & Specificity=90%					
Red Cross, First Time Donors	90%	90%	0.015%	0.1%	100%
Injection Drug Users in NYC	90%	90%	4.3%	29%	100%
MSM in Baltimore	90%	90%	8.5%	46%	99%
Adults in Botswana	90%	90%	37.0%	84%	94%

$$\frac{56{,}700}{60{,}400} = 0.94 = 94\%$$

Negative Predictive Value (NPV)

Question 5

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 2: Sensitivity=90% & Specificity=90%					
Red Cross, First Time Donors	90%	90%	0.015%	0.1%	100
Injection Drug Users in NYC	90%	90%	4.3%	29%	100
MSM in Baltimore	90%	90%	8.5%	46%	99
Adults in Botswana	90%	90%	37.0%	84%	94%

$$\frac{56{,}700}{60{,}400} = 0.94 = 94\%$$

Negative Predictive Value (NPV)

Question 5 (Group 43)

b. A colleague wants to use Test 2 in her clinical practice of 500 patients and asks you to calculate the PPV and the NPV of Test 2 in this population. Are you able to calculate these predictive values for her? If so, what are they? If not, why not?

Key Points

PPV & NPV depend on:

- **Prevalence**
- **Validity** of the test (sensitivity & specificity)

Key Points

PPV & NPV depend on:

- Prevalence
- Validity of the test (sensitivity & specificity)

Sensitivity & specificity are fixed characteristics of a test, so we can get those from the Table, but we don't have the prevalence of HIV in her clinical practice

Population	Sensitivity	Specificity	Prevalence	PPV	NPV
Test 2: Sensitivity=90% & Specificity=90%					
Red Cross, First Time Donors	90%	90%	0.015%	0.1%	100%
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MSM in Baltimore	90%	90%	8.5%	46%	99%
Adults in Botswana	90%	90%	37.0%	84%	94%

Question 6 (Group 43)

How would the positive predictive value (PPV) of the school nurse's test compare to the PPV of the physician's test if children were first tested with the physician's test and then tested with the nurse's test?

First, all children are screened by the physician:

Physician's Diagnosis	Heart Disease: Yes	Heart Disease: No	Total
Yes	180	180	
No	20	1620	
Total	200	1800	2000

$PPV_{physician}$=180 / (180+180) = 50%

Then, children who test positive on the physician's test are screened by the nurse:

Nurse's Diagnosis	Heart Disease: Yes	Heart Disease: No	Total
Yes	144	36	
No	36	144	
Total	180	180	

PPV_{nurse}=144 / (144+36) = 80%

Question 7 (Group 33)

The nurse's test was administered to all children and then the physician's test was administered only to those children who tested positive on the nurse's test. What are the benefits of screening in this manner? Are there potentially negative consequences of screening in this manner? [HINT: Refer to the Table you were asked to complete in the *PRE-Activity.*]

	Nurse's test	Physician's test
Sensitivity	80%	90%
Specificity	80%	90%
Positive Predictive Value	31%	80%
Net sensitivity*	72%	
Net specificity*	98%	

* Of the nurse's test and the physician's test combined when the nurse's test is administered first and all children who are labeled 'positive' are then tested by the physician

	Nurse's test	Physician's test
Sensitivity	80%	90%
Specificity	80%	90%
Positive Predictive Value	31%	80%
Net sensitivity*	72%	
Net specificity*	98%	

* Of the nurse's test and the physician's test combined when the nurse's test is administered first and all children who are labeled 'positive' are then tested by the physician

NET SENSITIVITY	
NET SPECIFICITY	

	Nurse's test	Physician's test
Sensitivity	80%	90%
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Positive Predictive Value	31%	80%
Net sensitivity*	72%	
Net specificity*	98%	

* Of the nurse's test and the physician's test combined when the nurse's test is administered first and all children who are labeled 'positive' are then tested by the physician

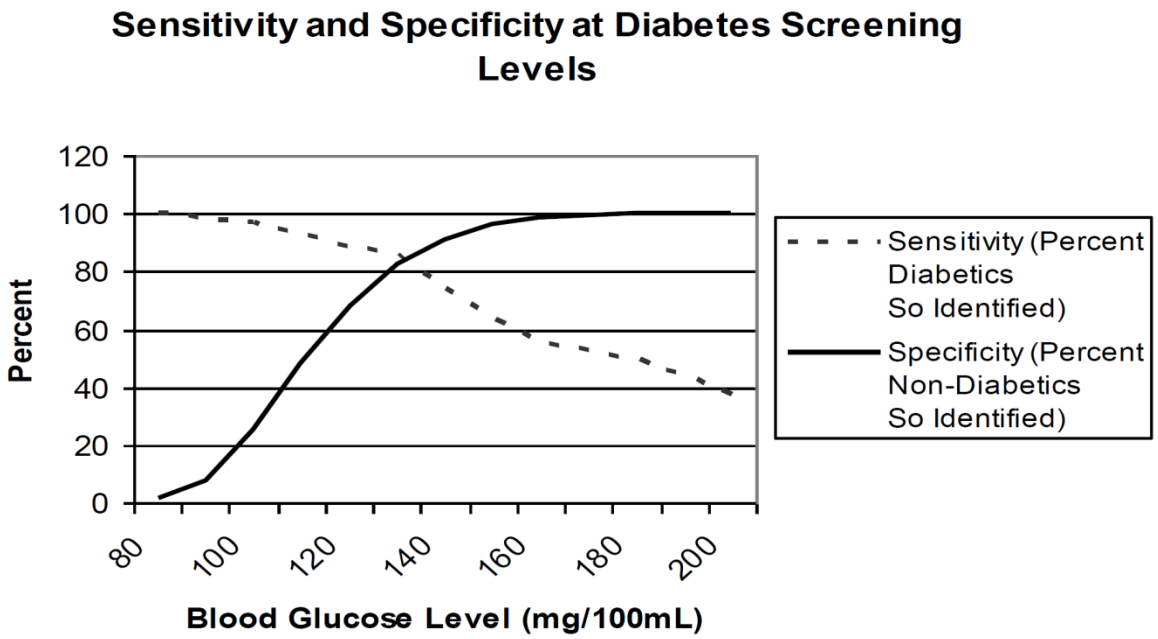
NET SENSITIVITY	↓
NET SPECIFICITY	↑

Testing in this way maximizes SPECIFICITY

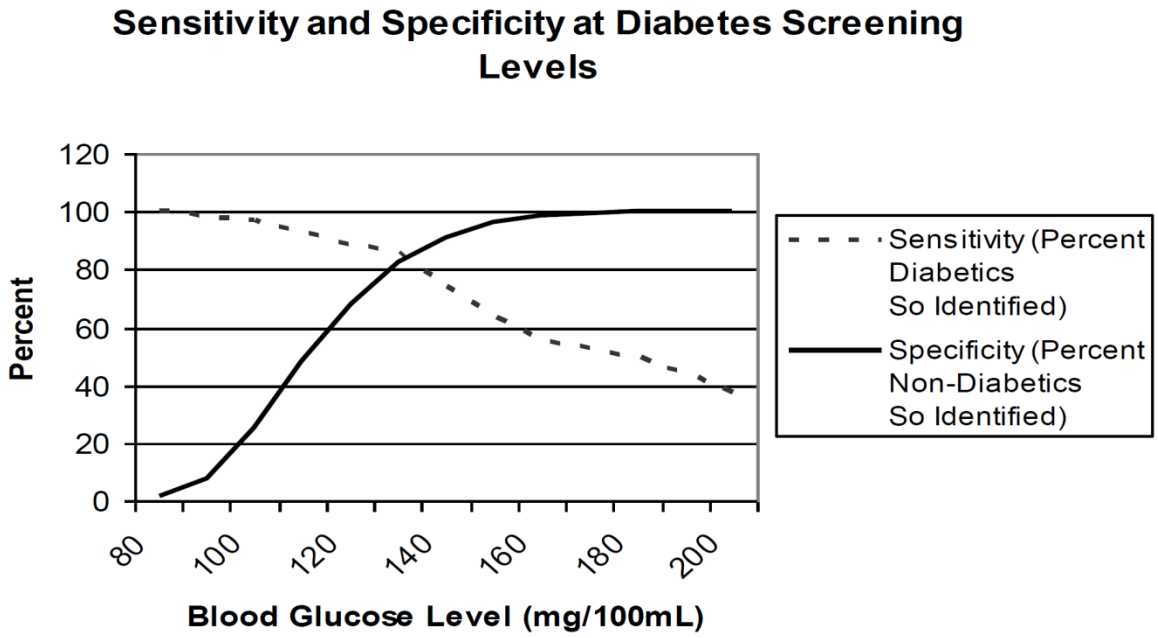
☆ It is more important to minimize false positives than to catch all cases of a disease

Question 8 (Group 33)

Does any pattern emerge regarding changes in sensitivity and specificity with the increasing blood glucose levels? If you were screening a population, what blood glucose level would you choose to consider positive? Why? What factors are important to consider when determining a cut-off level for a diagnostic test or screening program?



Question 8



- Which cutpoint is best?
- What factors are important to consider when determining a cut-off level for a diagnostic test or screening program?

Question 8

Which cutpoint is best?

- It depends on the importance of False Positive (FP) and False Negative (FN)

Consequences of FP:

- Emotional cost
- Financial cost to re-test
- More invasive test

Consequences of FN:

- Missed opportunity to treat

Recall… Outbreak Investigation PRE-Activity

First, you have to consider the best way in which to define a case of illness…A more strict definition would require more symptoms to be included in the definition of a case…Conversely, a less strict definition would require fewer symptoms…when using a *more strict* case definition, *fewer individuals will be identified as cases*. This means that you are likely to miss some cases among those individuals who were truly ill, but also that more individuals who truly are *not* ill will be correctly counted as non-cases.

Poll

Does a *more* strict case definition maximize sensitivity or specificity?

a. Sensitivity

b. Specificity

Poll

Does a *more* strict case definition maximize sensitivity or specificity?

a. Sensitivity

b. Specificity

Recall… Outbreak Investigation PRE-Activity

First, you have to consider the best way in which to define a case of illness…A more strict definition would require more symptoms to be included in the definition of a case…Conversely, a less strict definition would require fewer symptoms…when using a *more strict* case definition, *fewer individuals will be identified as cases*. This means that you are likely to miss some cases among those individuals who were truly ill, but also that more individuals who truly are *not* ill will be correctly counted as non-cases.

↓Sensitivity

↑Specificity

New ACC/AHA High Blood Pressure Guidelines Lower Definition of Hypertension

" High blood pressure should be treated earlier with lifestyle changes and in some patients with medication – at 130/80 mmHg rather than 140/90 – based on new ACC and American Heart Association (AHA) guidelines for the detection, prevention, management and treatment of high blood pressure."

Nov 13, 2017
http://www.acc.org/latest-in-cardiology/articles/2017/11/08/11/47/mon-5pm-bp-guideline-aha-2017

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Blood pressure categories in the new guideline are:

Normal: Less than 120/80 mm Hg;

Elevated: Systolic between 120-129 and diastolic less than 80

Stage 1: Systolic between 130-139 or diastolic between 80-89

Stage 2: Systolic at least 140 or diastolic at least 90 mm Hg

Hypertensive crisis: Systolic over 180 and/or diastolic over 120

While previous guidelines classified **140/90 mm Hg** as Stage 1 hypertension, this level is classified as Stage 2 hypertension under the new guidelines.

Nov 13, 2017
http://www.acc.org/latest-in-cardiology/articles/2017/11/08/11/47/mon-5pm-bp-guideline-aha-2017

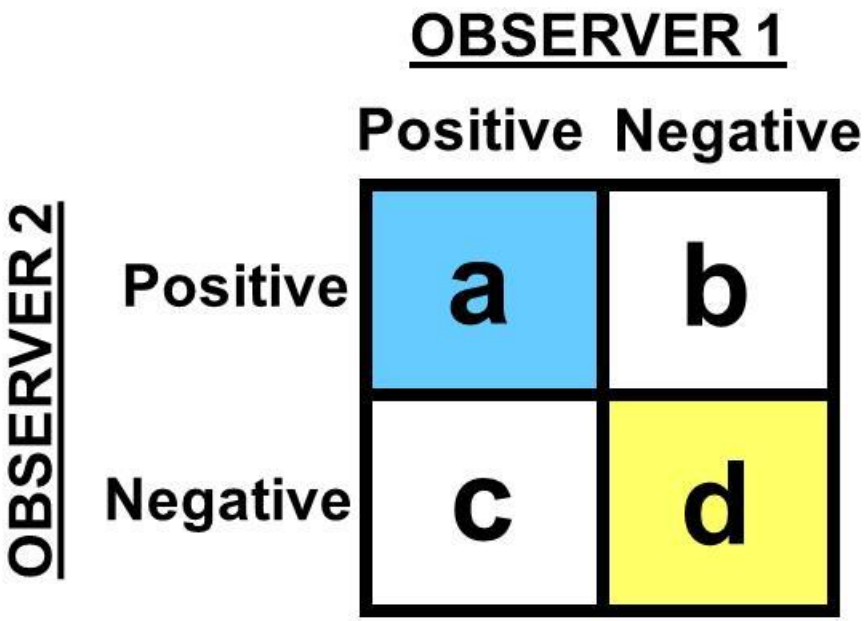
"The new guidelines … lower the definition of high blood pressure to account for complications that can occur at lower numbers and to allow for earlier intervention. The new definition will result in nearly half of the U.S. adult population (46%) having high blood pressure, with the greatest impact expected among younger people. Additionally, the prevalence of high blood pressure is expected to triple among men under age 45, and double among women under 45, the guideline authors note."

Nov 13, 2017
http://www.acc.org/latest-in-cardiology/articles/2017/11/08/11/47/mon-5pm-bp-guideline-aha-2017

Question 9 (Group 23)

Compare percent agreement to the Kappa statistic. How are they similar? How do they differ?

Overall Percent Agreement

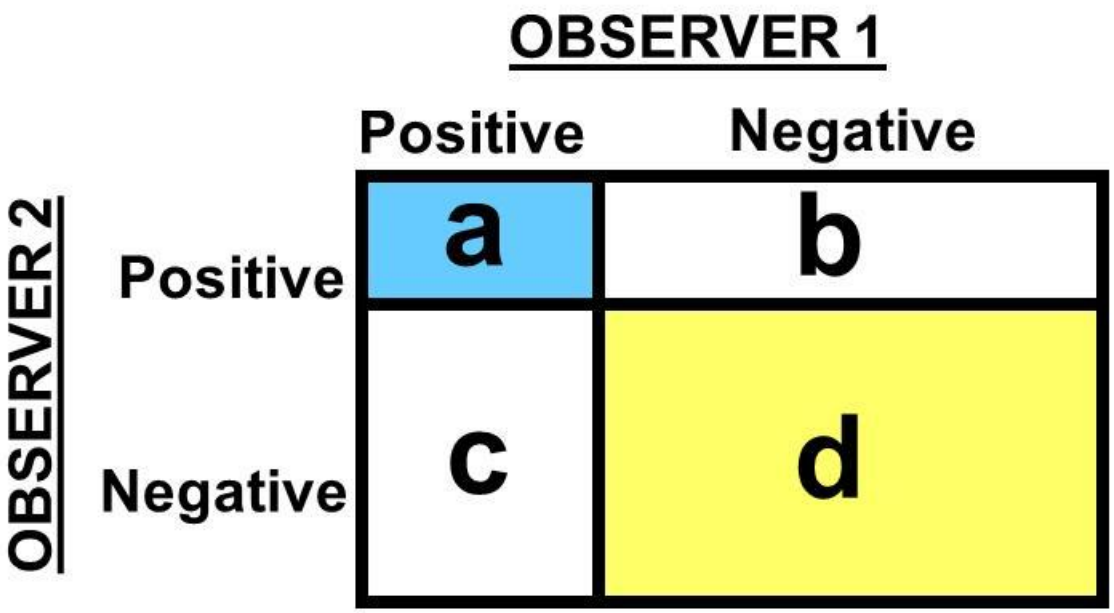


- **Percent agreement =**

$$\frac{a + d}{a + b + c + d}$$

Overall Percent Agreement

But generally, most people test negative:

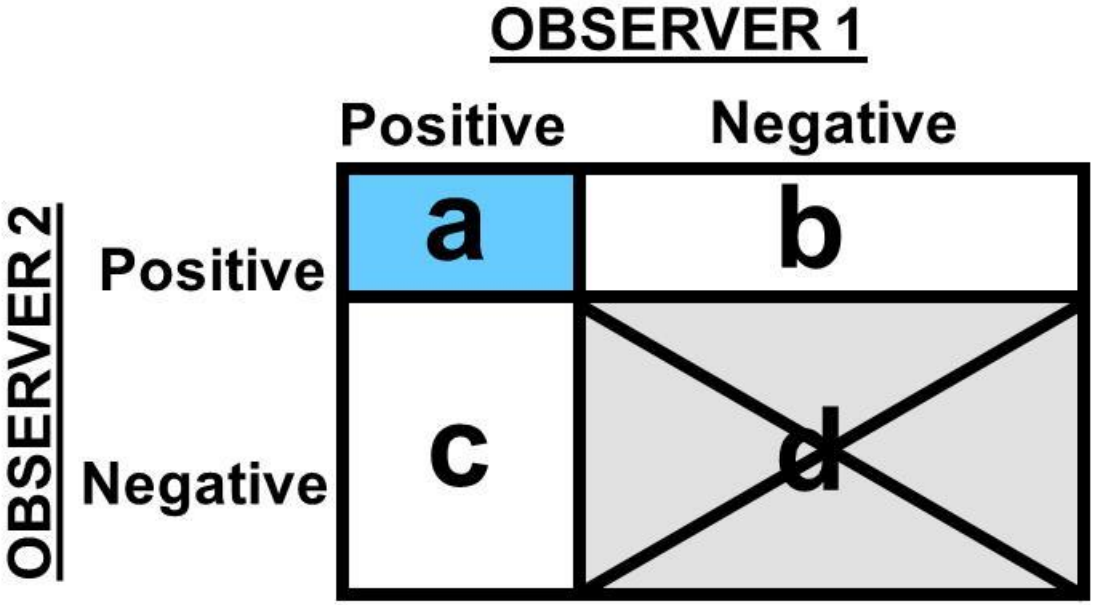


- **Percent agreement =**

$$\frac{a + d}{a + b + c + d}$$

- **In this case, a high percent agreement is due to observer agreement about who is negative**

Percent Positive Agreement



- **Percent agreement when at least one test is positive =**

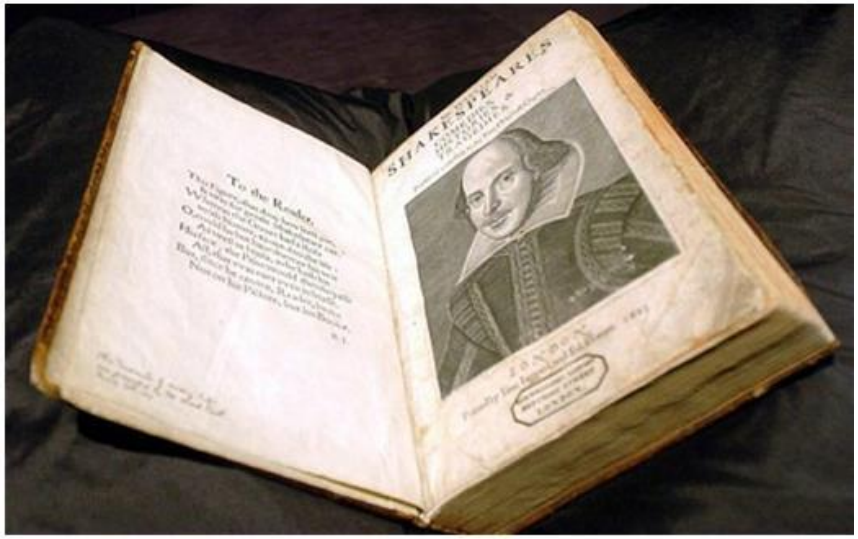
$$\frac{a}{a + b + c}$$

- **Tests that both observers classified as negative are removed from the calculation (*both the numerator and the denominator!*)**

Kappa Statistic

Recall…from Lecture…

- Sometimes observers will agree solely by chance
- The Kappa statistic allows us to calculate the level of agreement *independent of chance*
- *What is the agreement between observers beyond what would be expected by chance alone?*



Question 10 (Group 23)

Which would you prefer: a test that is reliable but not valid, or a test that is valid but not reliable? Why?

*Consider their *pros* and *cons*

Thank you to our presenters!

Questions?

GOOD LUCK *with*

the Midterm Exam!