

Suppose a company is developing a new pregnancy test. The test was put through a trial in which data was collected on 500 women who took the pregnancy test. The results of the trial are summarized below, in what is called a **two-way table**. A two-way table displays the counts for certain groups. For example, the value in the first row of numbers and the first column of numbers of the table shows that 165 of the 500 women were pregnant and had a positive pregnancy test. Answer the following questions to increase your familiarity with two-way tables.

Pregnancy Test Trial Results	Woman is Pregnant	Woman Is Not Pregnant
Pregnancy Test is Positive	165	9
Pregnancy Test is Negative	39	287

Now, pregnancy is not a disease, but it is a medical condition, so the terms sensitivity and specificity can still be used when describing a pregnancy test, based on whether the woman is or is not pregnant.

Make sure that you fill in each answer area before checking "How Did I Do?".

- a. What is the sensitivity of this pregnancy test, based on the collected data?

Round to the nearest tenth of a percent (1 decimal place).

Number %

- b. What is the specificity of this pregnancy test, based on the collected data?

Round to the nearest tenth of a percent (1 decimal place).

Number %

How Did I Do?

PSA Level (ng/mL)	Number of Men Without Prostate Cancer	Number of Men with Prostate Cancer
3 and above	6	4
2-2.99	9	3
1-1.99	12	2
0-0.99	13	1

a. Suppose the cut-off value is set at 2. What is the sensitivity for this group? What is the specificity?

The specificity is

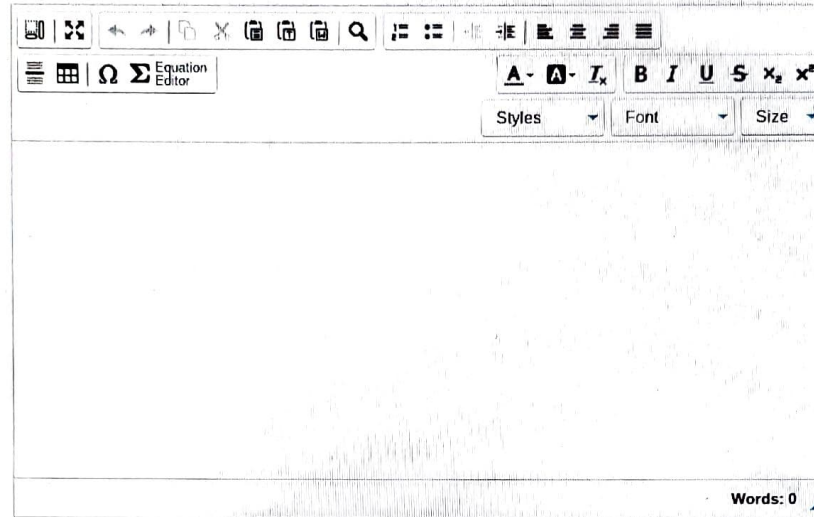
Number	%
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The sensitivity is

Number	%
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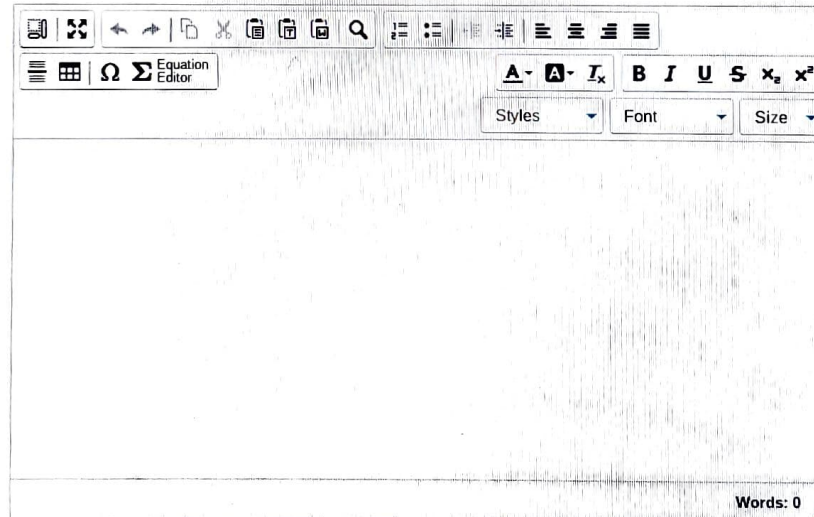
The specificity is	Number	%

c. What happened to sensitivity when the cut-off value was raised from 2 to 3? Why? Is this good or bad?



Words: 0

d. What happened to specificity when the cut-off value was raised from 2 to 3? Why? Is this good or bad?



Words: 0

e. Suppose the PSA cut-off value is dropped to 1. Given this PSA cut-off value:

How many healthy men among the group of 50 would be told incorrectly that they may have cancer?

How many men with cancer would be told incorrectly that they probably do not have cancer?

How many of the men would receive a correct diagnosis?

- Question 3

1 point

Below is a list of screening tools that are used to detect the presence or absence of certain conditions. Pick one screening tool and conduct some research to determine how effective it is. Can you find any information on the screening tool's sensitivity and specificity? Does your research indicate that there are any other quantitative measures of its effectiveness? State carefully where you obtained the information and whether or not you believe it is reliable.

- Mammograms are used to screen for breast cancer.
- There is an ELISA (Enzyme-Linked ImmunoSorbent Assay) test developed to screen for the presence of HIV, the virus that causes AIDS.
- The FDA recently approved a new over-the-counter AIDS test to screen for the presence of the HIV virus. "Over-the-counter" means that the test can be purchased at a pharmacy and used in the privacy of one's own home without having to send anything off to a lab for analysis.
- Exercise stress testing is sometimes used as a screening tool for Coronary Artery Disease (CAD).
- Over the counter pregnancy tests are available to quickly test for pregnancy.
- The Purified Protein Derivative (PPD) test is used to screen for tuberculosis. Sometimes this test is also called the Mantoux test or tuberculin sensitivity test.
- The Beck Depression Inventory is used to screen individuals for depression.

Styles

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- Question 4

1 point

Suppose a drug company is designing an over the counter HIV/AIDS test and they will not be able to develop a test that has both a very high sensitivity and a very high specificity. Which of these, sensitivity or specificity, is the most important to maximize? Explain your answer.