

**Example (Test Positive for Condition X):**

For individuals with Condition X, the level of enzyme Y in the blood is normally distributed with a mean of 75 and a standard deviation of 6. For individuals without Condition X, enzyme Y levels are normally distributed with a mean of 90 and a standard deviation of 3.

Draw the Chart:

- a) Intuitively, what values would make you think the patient has Condition X?
  
  
  
  
  
  
  
  
  
  
- b) At what enzyme Y level should the "Tested Positive for Condition X" threshold start so that only 0.005 of people with Condition X would test negative?
  
  
  
  
  
  
  
  
  
  
- c) What would be the probability of a false positive (an individual without Condition X tests positive)?

- d) A patient with Condition X has an enzyme Y level of 80. Will we properly diagnose that patient?
- e) A patient with Condition X has an enzyme Y level of 85. Will we properly diagnose that patient?
- f) A healthy patient has an enzyme Y level of 80. Will we properly diagnose that patient?
- g) A healthy patient has an enzyme Y level of 85. Will we properly diagnose that patient?

**Example (Blood Sugar Levels):** For individuals with diabetes, blood sugar levels (mg/dL) after fasting are normally distributed with a mean of 160 and a standard deviation of 10. For individuals without diabetes, the distribution has a mean of 90 and a standard deviation of 7.

Draw the Chart

- a) Intuitively, what values would make you think the patient has diabetes?
  
  
  
  
  
  
  
  
  
  
- b) Where would you set the threshold for "Tested Positive for Diabetes" so that the probability of a diabetic patient testing negative is 0.001?
  
  
  
  
  
  
  
  
  
  
- c) What is the probability of a false positive (non-diabetic individual tests positive)?

- d) A diabetic patient has a fasting blood sugar level of 150. Will we properly diagnose that patient?
  
  
  
  
  
  
  
  
  
  
- e) A diabetic patient has a fasting blood sugar level of 170. Will we properly diagnose that patient?
  
  
  
  
  
  
  
  
  
  
- f) A non-diabetic individual has a fasting blood sugar level of 150. Will we properly diagnose that patient?
  
  
  
  
  
  
  
  
  
  
- g) A non-diabetic individual has a fasting blood sugar level of 170. Will we properly diagnose that patient?