In this tutorial, you're going to learn about false positives and false negatives. So when we do tests in medical scenarios or any kind of tests to see if something is present, tests that we deal with in everyday life, they're not always 100% accurate. So occasionally, tests will determine one thing when in fact the reality is that the opposite is true.

So let's use the example of a home pregnancy test. It might tell women that she's pregnant when in reality she's not. Hopefully, if the result says that she's pregnant, then she will be. But sometimes, it tells a woman she's pregnant when she's not.

Scenarios like this are called a false positive. And a false positive result is when the thing being tested for is mistakenly shown to be present when in fact it's not present. So for instance, a false positive doesn't have to be like-- positive is not going to be a happy result all the time. For instance, a false positive could occur if a person is told that they have cancer when in fact they don't. It's just the thing being tested for is mistakenly shown to be present when in fact it's not. If they're told that they have cancer when in fact they don't, that would be a false positive as well.

Or the other mistake that could happen is the home pregnancy test could tell the woman that she's not pregnant when in fact she is. And this would be known as a false negative. And a false negative result is when the thing being tested for is mistakenly shown to be absent and in fact it's present. So she actually is going to have this baby. But the home pregnancy test says not so much.

So how common are errors like this? It depends largely on the tests. Different tests have different levels of accuracy and sensitivity. So most home pregnancy tests claim to be 99% effective at detecting pregnancy, so detecting it accurately when it's present, when conducted properly.

However, let's say that the woman did the test too early. Tests done too early can reduce the effectiveness to around 90%, which means that the probability of a false negative, where the test says that she's not pregnant when really she is, it's about a 10% likelihood, which is a significant amount. One out of 10 pregnant women will be told that they are not pregnant when really they are. That's a substantial amount. We would like to have the false negative be closer to something like 1%, like the test claims.

False positives are typically more rare. Because these home pregnancy tests detect particular hormones, it's tough for the test to say that they're there when really they're not. So when a woman is not pregnant, a test will show this in about 98% of those cases when she's not pregnant, which means the false positive rate, when a woman is not pregnant it says that she's pregnant, is about 2%.

So the question is, is this a huge deal? Well, let's go through and say there were 100 women who took these pregnancy tests. We would like all 1,000 to get the right answer. So suppose 60 of them who took the pregnancy test in fact were pregnant and 40% were not. That would mean that there's 400 not pregnant women and 600 pregnant women.

However, then suppose that they all took these pregnancy tests. Of those 600 women, 90% would be correctly told that they were pregnant. And these would be women who are going to have a baby and know it. The false negatives would be women who are pregnant and don't know it, so that's 60% out of the 1,000, which like we decided was a fairly significant amount. Ideally we would like that to be lower.

And then of the 400 women who aren't pregnant, 98% will be correctly told, the 392 will be correctly told that they're not pregnant, whereas eight of them will be incorrectly told that they are pregnant. So combined, that's 68 women here that have the incorrect result. So we would like that number to be lower. And apparently when tests are taken later we can reduce this 10% number to a number much lower, thereby reducing the 60 to a much lower number.

And so to recap, false positives and false negatives are an inevitable part of a testing process. When something's not 100% effective, you're going to get these errors. Our goal is to try and reduce those error rates if we can. Both types of errors are fairly rare in most cases, although when tests are conducted properly, those errors can increase in likelihood. And so we talked about false positives and false negatives.

Good luck. And we'll see you next time.