

Name: _____

Date: _____

False discovery rate

1. The T.S.A. at PDX investigates 10,000 pieces of luggage per day (this is a guess based on something like 25,000 daily travelers). Let's hypothesize that their false positive rate is 2% (made-up). Let's say their false negative rate is 7% (also made-up). In all the luggage, let's say 3% have contraband (why would the T.S.A. let any of these figures be known?).
 - a. What does the false positive rate mean in this situation?
 - b. What does the false negative rate mean in this situation?
 - c. For every piece of luggage the T.S.A. moves to secondary screening (it set off the sensors in the first round), how many pieces of luggage actually have contraband?
2. You have a theory that squirrels are psychic if they eat cinnamon (you believe they can see through time and space). Your fellow researchers say there's a 1% chance this theory is right—it seems unlikely, but squirrels do behave weirder than normal once they eat cinnamon. Let's say there's a 0% false negative rate to your experimental design. How low would your false positive rate on this experiment need to be for your false discovery rate to be below 50%?
3. Explain why the following statement is true:

Lowering the threshold p -value of statistical significance lowers the Type 1 error rate and also the power.
4. Explain how you can raise confidence and lower the Type 2 error rate at the same time.
5. Make up your own example, complete with two-way tables, to demonstrate the following true statement:

An unlikely theory will have a high false discovery rate. But even with the same false positive and false negative rate, a more likely theory will have a lower false discovery rate.