

# ECS 315: In-Class Exercise # \_

## Instructions

1. Separate into groups of no more than three persons. **The group cannot be the same as any of your former groups.**
2. **Write down all the steps** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.
3. **Do not panic.**

Date: <b>11 / 09</b> / 2018			
Name			ID (last 3 digits)
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$$P(\text{HIV}) = 1/10 = 0.1$$

Suppose that for the Land of Oz, 1 in 10 people carries the human immunodeficiency virus (HIV). A test for the presence of HIV yields either a positive (+) or negative (-) response. Suppose the test gives the correct answer 90% of the time. (The test is 90% accurate.)

- (a) What is  $P(-|\text{HIV})$ , the conditional probability that a person tests negative given that the person does have the HIV virus?

The test gives incorrect result.

$$P(-|\text{HIV}) = 1 - P(+|\text{HIV}) = 1 - 0.9 = 0.1$$

- (b) Find the probability that a randomly chosen person tests positive.

$$\begin{aligned} P(+) &= P(+|\text{HIV})P(\text{HIV}) + P(+|\text{HIV}^c)P(\text{HIV}^c) \\ &= 0.9 \times 0.1 + 0.1 \times (1 - 0.1) \\ &= 0.09 \times 2 = 0.18 \end{aligned}$$

- (c) Find the conditional probability that a randomly chosen person has the HIV virus given that the person tests positive.

$$P(\text{HIV} | +) = \frac{P(+|\text{HIV})P(\text{HIV})}{P(+)} = \frac{0.9 \times 0.1}{0.18} = \frac{1}{2} = 50\%$$