

ECS 315: In-Class Exercise # 6 Solution

Instructions

1. Separate into groups of no more than three persons.
2. The group cannot be the same as your former group.
3. Only one submission is needed for each group.
4. 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.
5. Do not panic.

Date: 12 / 09 / 2017			
Name			ID (last 3 digits)
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Suppose that for the Land of Oz, 1 in 5 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 80% of the time. (The test is 80% accurate.)

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

test gives incorrect result

$$P(-|HIV) = 1 - 0.8 = 0.2$$

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

$$\begin{aligned}
 P(+) &= P(+|HIV)P(HIV) + P(+|HIV^c)P(HIV^c) \\
 &= 0.8 \times \frac{1}{5} + \frac{1}{5} \times \left(1 - \frac{1}{5}\right) = 2 \times \frac{4}{25} = \frac{8}{25} = \frac{32}{100} = 0.32
 \end{aligned}$$

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

$$P(HIV|+) = \frac{P(+|HIV)P(HIV)}{P(+)} = \frac{4/25}{8/25} = 50\%$$