

Quiz 3

ECEn 370

Name: _____ Key _____

1. Consider a (fictitious) test for cancer with the following properties:

A = Event that the test indicates a person has cancer.

B = Event that the person has cancer.

It is known that $P[A|B] = P[A^c|B^c] = 0.99$ and $P[B] = 0.004$ in the general population.

- a) Find $P[B|A]$ (the probability a person who the test says has cancer actually does have cancer). (Hint: Recall $P[A|B^c] = 1 - P[A^c|B^c]$)

Example 1.7-2 from the text:

Applying Bayes' rule:

$$\begin{aligned} P[B|A] &= \frac{P[A|B]P[B]}{P[A|B]P[B] + P[A|B^c]P[B^c]} \\ &= \frac{(0.99)(0.004)}{(0.99)(0.004) + (0.01)(0.996)} \\ &= 0.284 \end{aligned}$$

This is terrible!

- b) Is this a reliable test? Why?

No, 72% of those who the test says have cancer really don't!!!!