

HW1

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1)

Setup:

$P(p), P(n)$: Probability of positive/negative result

$P(C) = .001, P(nC) = .999$ Probability of cancer/no cancer

$P(p|C) = .98, P(n|nC) = .96 \implies P(n|C) = .02, P(p|nC) = .04$

$P(p) = P(p|C) * P(C) + P(p|nC) * P(nC) = .98(.001) + .02(.04) = 0.00178$

a) $P(C|p) = \frac{P(p|C)P(C)}{P(p)} = \frac{.98(.001)}{.00178} = .551$

- b) Given the likelihood of having cancer given a positive result is only around 1/2, I would suggest to the researchers that they either repeat the test multiple times on a subject (useful if test is cheap/fast) or find a way to reduce the chance of a positive result when the patient doesn't have cancer (given the current values, that will have a larger impact than increasing positive results if they do have cancer).

2)