3. If a coin is bent so that it has a 40% probability of coming up heads, what is the probability of getting *exactly* 6 heads in 10 throws?

1 / 1 point

- ○ 0.0974
- ○ 0.1045
- ◉ 0.1115
- ○ 0.1219

Correct

$\binom{10}{6} \times 0.4^6 \times 0.6^4 = 0.1115$

4. A bent coin has 40% probability of coming up heads on each independent toss. If I toss the coin ten times, what is the probability that I get at least 8 heads?

1 / 1 point

- ◉ 0.0123
- ○ 0.0132
- ○ 0.0312
- ○ 0.0213

Correct

The answer is the sum of three binomial probabilities:

$((\binom{10}{8} \times (0.4^8) \times (.6^2)) + ((\binom{10}{9} \times (0.4^9) \times (0.6^1))+$

$((\binom{10}{10}) \times (0.4^{10}) \times (0.6^0))$

5. Suppose I have a bent coin with a 60% probability of coming up heads. I throw the coin ten times and it comes up heads 8 times.

1 / 1 point

What is the value of the "likelihood" term in Bayes' Theorem -- the conditional probability of the data given the parameter.

- ○ 0.122885
- ○ 0.043945
- ◉ 0.120932
- ○ 0.168835

Correct

Bayesian "likelihood" --- the p(observed data | parameter) is

p(8 of 10 heads | coin has p = .6 of coming up heads)

$\binom{10}{8} \times (0.6^8) \times (0.4^2) = 0.120932$

6. We have the following information about a new medical test for diagnosing cancer.

1 / 1 point

Before any data are observed, we know that 5% of the population to be tested actually have Cancer.

Of those tested who do have cancer, 90% of them get an accurate test result of "Positive" for cancer. The other 10% get a false test result of "Negative" for Cancer.

Of the people who do not have cancer, 90% of them get an accurate test result of "Negative" for cancer. The other 10% get a false test result of "Positive" for cancer.

What is the conditional probability that I have Cancer, if I get a "Positive" test result for Cancer?

**Formulas in the feedback section are very long, and do not fit within the standard viewing window. Therefore, the font is a bit smaller and the word "positive test" has been abbreviated as PT.

- ○ 9.5%
- ○ 4.5%
- ◉ 32.1% probability that I have cancer
- ○ 67.9%

Correct

I still have a more than $\frac{2}{3}$ probability of not having cancer

Posterior probability:

p(I actually have cancer | receive a "positive" Test)

By Bayes Theorem:

$= \frac{\text{(chance of observing a PT if I have cancer)(prior probability of having cancer)}}{\text{(marginal likelihood of the observation of a PT)}}$

$= \frac{p(\text{receiving positive test} | \text{ has cancer})p(\text{has cancer [before data is observed]})}{p(\text{positive } | \text{ has cancer})p(\text{has cancer})+p(\text{positive } | \text{ no cancer })p(\text{no cancer})}$

= (90%)(5%) / ((90%)(5%) + (10%)(95%)

=32.1%