

Math 10B, Quiz 6

- (12 points) Suppose you are investigating the theft of a valuable trading card. There are two suspects, Tom and Sue. Before seeing any evidence, you believe there is a 60% chance that Tom is guilty and a 10% chance that Sue is guilty. You also believe that if Tom committed the crime, there is a 10% chance he would have sold the card on ebay and if Sue committed the crime, there is a 50% chance she would have sold the card on ebay. If you learn that the card was sold on ebay (and no other new evidence) who should you now believe is more likely to be guilty? Make sure to show your work and give a clear explanation of your answer. (Hint: Bayes' theorem. Hint 2: You don't need to know the overall probability that the card would be sold on ebay to answer the question.)
- (1 point) Suppose A and B are independent events and that $P(A) = 0.5$ and $P(B) = 0.8$. Then $P(A | B) = 0.5$. True False
- (1 point) Suppose you roll a fair six-sided die. The following are independent events: rolling a one and rolling a three. True False
- (1 point) On an exam, a question asks: "You draw four cards from a standard deck of 52. What is the probability of getting no hearts?" One student gives the answer of $1 - \frac{\binom{13}{4}}{\binom{52}{4}}$ reasoning as follows: to find the probability of the event of getting no hearts, you can instead find the probability of its complement and subtract that from 1. The complement of the event of getting no hearts is the event of getting all hearts and the probability of this is $\frac{\binom{13}{4}}{\binom{52}{4}}$ (the number of ways to pick 4 hearts) divided by $\binom{52}{4}$ (the number of ways to pick 4 cards of any kind). The student's answer is:
 - Too small
 - Correct
 - Too large