

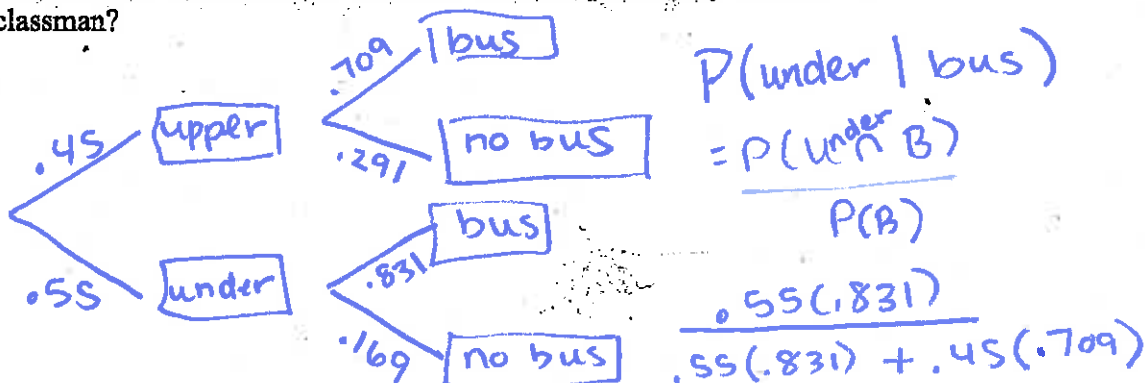
Tree Diagrams

KEY

Tree Diagrams are for problems that have different ways or paths in which the probability of the sequences of outcomes can be calculated by multiplying out a branch. Certain branches can be added together at the end to find the probability of some larger concept. You'll know to use this when a problem can be broken down into a sequence of events where the question provides you with the probabilities associated with almost all the outcomes for each event AND the probabilities for those outcomes are dependent(conditional) on the events that happen beforehand. A tree diagram often has many branches. Here are some problems:

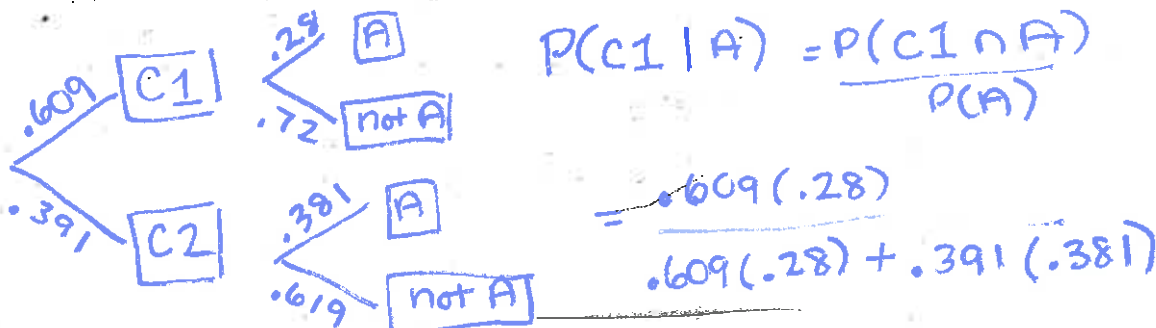
- 1) In a high school there are 638 underclassmen (9th and 10th graders) and 523 upperclassmen (11th and 12th graders). Of the underclassmen 83.1% take the bus to school, and of the upperclassmen 70.9% take the bus to school. If a student is chosen at random from those students who take the bus to school, what is the probability that this student is an underclassman?

- (A) .0457
(B) 0.550
(C) 0.588
(D) 0.671
(E) 0.831



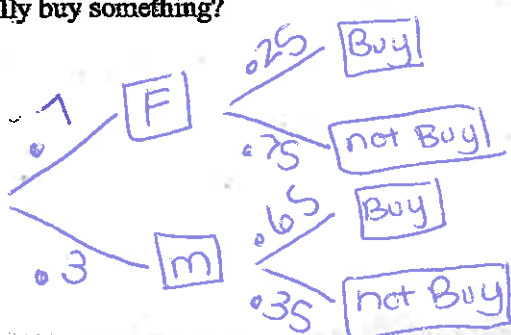
- 2) A college offers two courses in calculus: Calculus 1 and Calculus 2. Last semester, 60.9% of calculus students took Calculus 1 and the rest took Calculus 2. (No student took both courses.) Of the students who took Calculus 1, 28.0% received A's, and of the students who took Calculus 2, 38.1% received A's. If a student is selected at random from those who received A's in calculus, what is the probability that the student took Calculus 1?

- (A) 0.170
(B) 0.280
(C) 0.534
(D) 0.609
(E) 0.720



- 3) A manager of Old Navy determines that 70% of her customers are female and 30% male. She also determined that if a customer was female there was a 25% chance they will actually buy something as opposed to just looking. If a customer is male, she determined that there is a 65% chance that they will buy something as opposed to just looking. What is the probability that a customer will actually buy something?

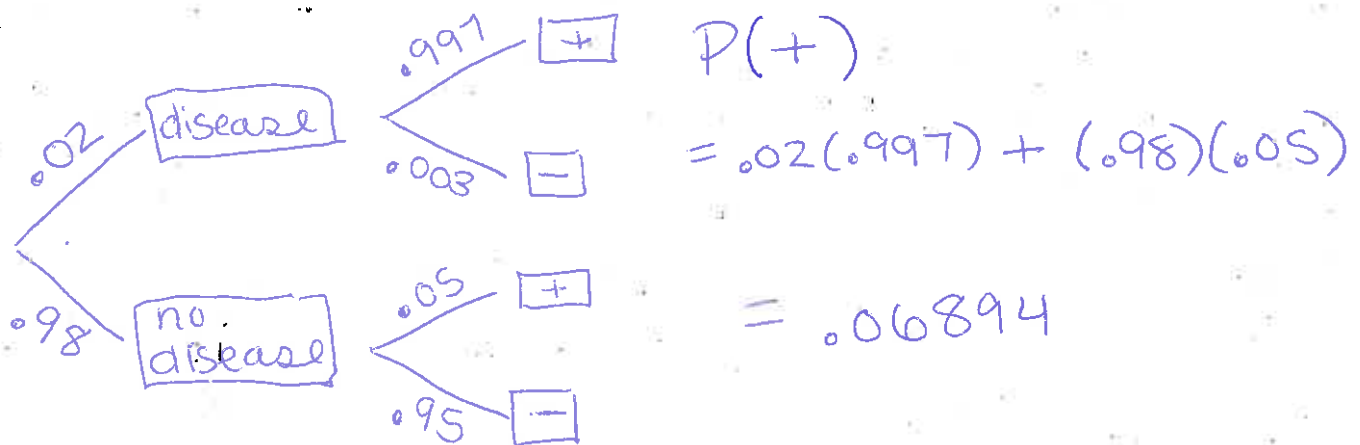
- a) .1625
b) .90
c) .37
d) .20
e) .694



$$P(\text{Buy}) = 0.7(0.25) + 0.3(0.65)$$

7. A laboratory test for the detection of a certain disease gives a positive result 5 percent of the time for people who do not have the disease. The test gives a negative result 0.3 percent of the time for people who have the disease. Large-scale studies have shown that the disease occurs in about 2 percent of the population.

(a) What is the probability that a person selected at random would test positive for this disease? Show your work. *with a tree diagram*



(b) What is the probability that a person selected at random ^{given they} tests positive for the disease does not have the disease? Show your work.

$$\begin{aligned}
 P(\text{no disease} \mid +) &= \frac{P(\text{no disease} \cap +)}{P(+)} \\
 &= \frac{0.98(0.05)}{0.06894} = 0.711
 \end{aligned}$$