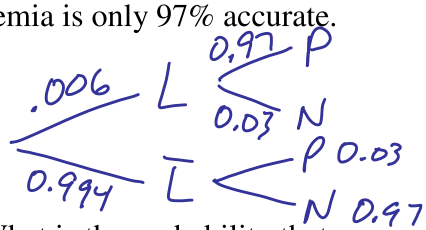
Independent events are dealt with in the same fashion as with conditional probabilities. A tree diagram is used to assist with what is asked.

Example 1: Suppose 0.6% of the population have leukemia and the medical test for leukemia is only 97% accurate.



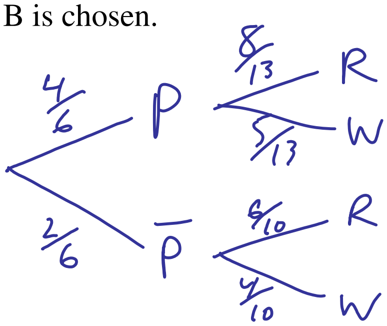
a) What is the probability that a person will test negative?

$$(0.006)(0.03) + (0.97)(0.994) = 0.964$$

b) What is the probability that a person who tests negative actually does have leukemia?

$$P(L \mid N) = \frac{P(L \text{ and } N)}{P(N)} = \frac{(0.006)(0.03)}{0.964} = 0.00019$$

Example 2: Bag A contains 5 white candies and 8 red candies. Bag B contains 4 white candies and 6 red candies. A fair die is rolled and if a prime number comes up, a candy is randomly selected from Bag A. If a prime number is not rolled, candy from Bag B is chosen.



a) What is the probability of selecting a red candy?

$$\left(\frac{4}{6}\right)\left(\frac{8}{13}\right) + \left(\frac{2}{6}\right)\left(\frac{6}{10}\right) = 0.6134$$

b) If a red candy is selected, what is the probability that this candy came from Bag B?

$$P(B \mid R) = \frac{P(B \text{ and } R)}{P(R)} = \frac{\left(\frac{2}{6}\right)\left(\frac{6}{10}\right)}{0.6134} = 0.326$$

c) Given that a white candy is selected, what is the probability that this candy came from Bag A?

$$P(A \mid W) = \frac{P(A \text{ and } W)}{P(W)} = \frac{\left(\frac{4}{6}\right)\left(\frac{5}{13}\right)}{\left(\frac{4}{6}\right)\left(\frac{5}{13}\right) + \left(\frac{2}{6}\right)\left(\frac{4}{10}\right)} = 0.658$$