Math 160, Finite Mathematics for Business

Chapter 6 Quiz Review - Discussion Notes
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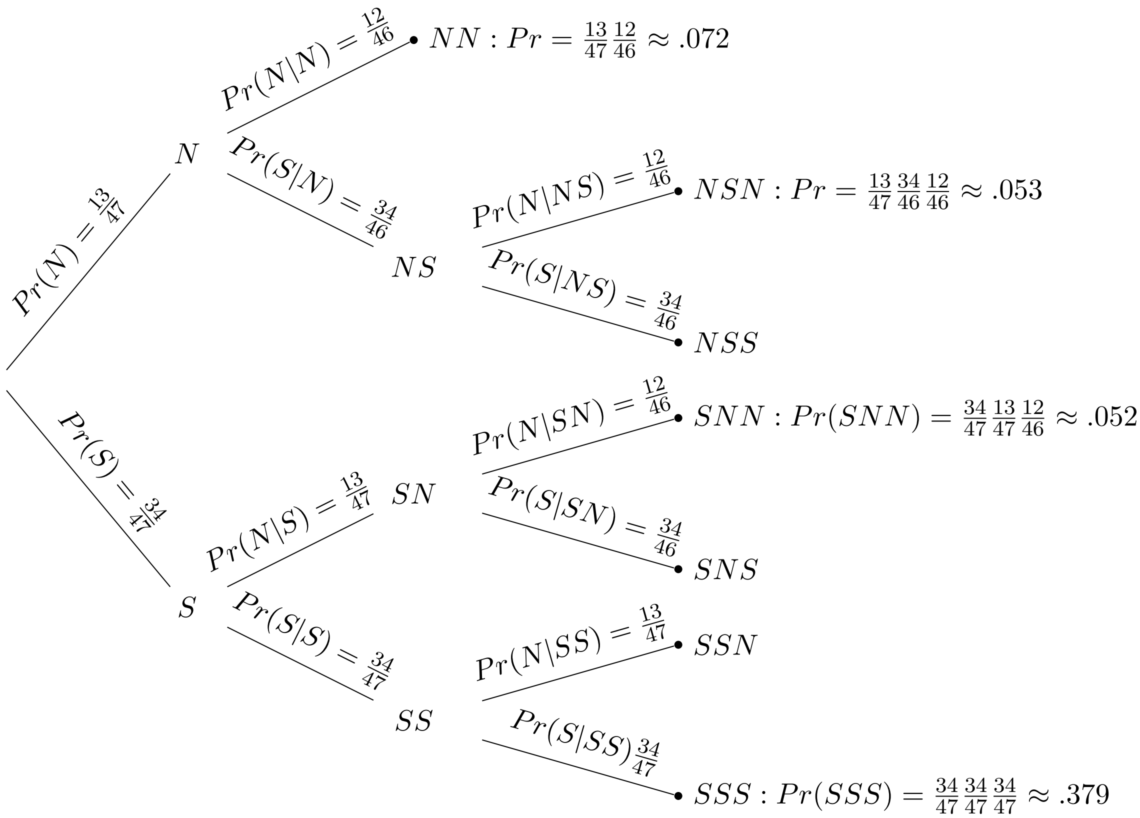
1) Students in class are wearing 5 colored shirts: blue, red, yellow, white and green. The sample space of shirt colors is b, r, y, w, g. If P(b)=.15, P(r)=.17, P(y)=.42 and P(g)=.02, what is the probability a student is wearing a white shirt?
Because the sum of all probabilities in a probability distribution must add up to 1, $Pr(w) = 1 - Pr(b) - Pr(r) - Pr(y) - Pr(g) = 1 - .15 - .17 - .42 - .02 = .24$

2) I'm planning a skiing vacation to Colorado. I'll be spending 5 days in Aspen. If the forecast calls for a 50% chance of snow every day, what is the probability that I have 4 snowy days?
This can be calculated using the fact that the probability of an event is the number of outcomes in the event / the number of outcomes in the sample space. We need to calculate (a) the number of ways of having 4 out of 5 days snowy and (b) the total number of possible 5-day weather patterns. Because there's an equally likely chance of snow or no-snow, this problem is akin to a coin-flipping problem.
There are $\binom{5}{4} = 5$ ways that 4 of 5 days are snowy.
Because there are 2 possibilities for weather on each day, and 5 days, there are $2^5 = 32$
So $Pr(4\ snowy\ days) = \frac{5}{32}$

3) Considering two events E and F, it is given that: $Pr(E) = .50$, $Pr(F) = .30$ and E and F are independent. What is $Pr((E \cup F)')$?
Because E and F are independent, $Pr(E \cap F) = Pr(E) \cdot Pr(F) = .50 \cdot .30 = .15$
Next we can use the Inclusion-Exclusion rule that $Pr(E \cup F) = Pr(E) + Pr(F) - Pr(E \cap F) = .50 + .30 - .15 = .65$
Lastly, we can use the fact that the probability of the COMPLEMENT of an event is 1 minus the probability of that event. So $Pr((E \cup F)') = 1 - Pr(E \cap F) = 1 - .65 = .35$

4) You've got a box with 34 screws and 13 nails. You need 2 nails. For each draw, you reach and take one out - if it is a nail you keep it on the table, if it is a screw you put it back in the box. Draw and label a tree diagram to answer the following questions:
a) Which is more likely: drawing a nail then a screw or a screw then a nail?
b) What is the probability of getting 2 nails in 2 draws?
c) What is the probability of getting 2 nails in 3 or fewer draws?
d) What is the probability that you don't get a single nail after 3 draws?



So the answer to the first question requires us to compare $Pr(NS)$ and $Pr(SN)$.
$Pr(NS) = \frac{13}{47} \cdot \frac{34}{46} \approx .204$
$Pr(SN) = \frac{34}{47} \cdot \frac{13}{47} \approx .200$
So It's more likely that you draw a nail THEN a screw.

As you can see from the tree, $Pr(NN) \approx .072$

Probability of 2 nails in 3 or fewer draws is the sum of $Pr(NN) + Pr(NSN) + Pr(SNN) \approx .072 + .053 + .052 = .177$

Probability of 3 screws in 3 draws is .379, as you can see from the tree.