

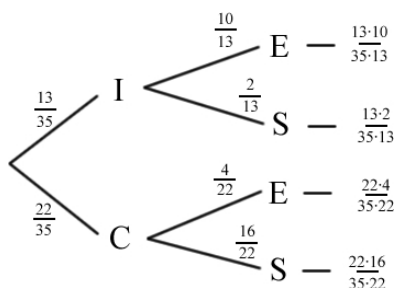
**Chapter 7 review**  
**Math 111 Sec FC01**

**Answers**

The Organization of American States (OAS) has 35 member nations, 13 of them island nations and 22 of them continental. Of the island nations, 2 of them have Spanish as an official language, and 10 of them have English as an official language. Of the continental nations, 16 have Spanish as an official language, and 4 of them have English as an official language.

1. Draw a tree diagram or a probability table which represents this data.

Let  $I$  = Island nations,  $C$  = continental nations,  $E$  = English-speaking, and  $S$  = Spanish-speaking.



2. A student at a model OAS session selects a nation at random to represent.

(a) What is the probability that the nation she selects:

- is an island nation?  
 $\frac{13}{35}$
- has English as an official language?  
 $\frac{13 \cdot 10}{35 \cdot 13} + \frac{22 \cdot 4}{35 \cdot 22}$
- has Spanish as an official language?  
 $\frac{13 \cdot 2}{35 \cdot 13} + \frac{22 \cdot 16}{35 \cdot 22}$

(b) Suppose she selects a nation with Spanish as an official language. What is the probability:

- that she selected an island nation?  
*Bayes's Theorem:*  $P(I|S) = \frac{P(I) \cdot P(S|I)}{P(I) \cdot P(S|I) + P(C) \cdot P(S|C)} = \frac{\frac{13 \cdot 2}{35 \cdot 13}}{\frac{13 \cdot 2}{35 \cdot 13} + \frac{22 \cdot 16}{35 \cdot 22}}$
- that she selected a continental nation?  
*Bayes's Theorem:*  $P(C|S) = \frac{P(C) \cdot P(S|C)}{P(I) \cdot P(S|I) + P(C) \cdot P(S|C)} = \frac{\frac{22 \cdot 16}{35 \cdot 22}}{\frac{13 \cdot 2}{35 \cdot 13} + \frac{22 \cdot 16}{35 \cdot 22}}$

3. Let  $I$  be the event that she chooses an island nation, and  $E$  be the event that she chooses a nation with English as an official language. Are the events  $I$  and  $E$  independent?

No. Using the independence test,  $P(E) = \frac{13 \cdot 10}{35 \cdot 13} + \frac{22 \cdot 4}{35 \cdot 22}$ , and  $P(E|I) = \frac{10}{13}$