1. An engineering firm is hired to determine if certain waterways in Minnesota are safe for fishing. Samples are taken from three rivers.

   (a) List the elements of a sample space S, using the letter F for safe to fish and N for not safe to fish.

   (b) List the elements of S corresponding to the event E that at least two of the rivers are safe for fishing.

   (c) Define an event that has sample points $\{, FFF, NFF, FFN, NFN\}$.

(a) $S = \{FFF, FFN, FNF, NFF, NNF, NFN, FNN, NNN\}$

(b) $E = \{FFF, FFN, FNF, NFF\}$

(c) $\{FFF, NFF, FFN, NFN\}$ = second river is safe for fishing

2. Students at a college are classfied as being freshmen, sophomores, juniors, or seniors, and also according to whether they are male or female. Find the total number of possible classifications for the students of that college.

$4 \times 2 = 8$

3. In a high school graduating class of 100 students, 54 took math, 69 took history, 35 took both. If one student is selected randomly, find the probability that

   (a) the student took math OR history.
   (b) the student student did not either of these two.
   (c) the student took math but not history.

   Let $M = \{$ took math $\}$, $H = \{$ took history $\}$

   (a)

   $$P(M \cup H) = P(M) + P(H) - P(M \cap H) = 0.54 + 0.69 - 0.35$$

   $$= 0.88$$

   (b) $P((M \cup H)') = 1 - P(M \cup H) = 1 - 0.88 = 0.12$

   (c) $P(M \cap H') = P(M) - P(M \cap H)$

   $$= 0.54 - 0.35 = 0.21$$

4. The probability that a doctor correctly diagnosed a particular illness is 0.7. Given that the doctor makes an incoorect diagnosis, the probability that the patient files a lawsuit is 0.9. What is the probability that the doctor makes an incorrect diagnosis AND the patient sues?

   Let $CD = $ correctly diagonosed. $P(CD) = 0.7$. $P((CD)') = 0.3$

   $S = $ patient sued. $P(s|(CD)') = 0.9$

   $P((CD)' \cap S) = P((CD)') \cdot P(s|(CD)') = (0.3) \cdot (0.9) = 0.27$

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