VanWyk's 103 **Section 3.1 Homework Problems**

TERMS YOU SHOULD KNOW: *experiment, outcome, sample space, event, probability*

1. Here is an experiment: an honest coin is tossed three times.
   (a) What is the sample space for this experiment?
   (b) Give an example of an outcome for this experiment.
   (c) What is the probability of your outcome?
   (d) Give an example of an event for this experiment that is not an outcome.
   (e) What is the probability of your event?
2. Suppose you toss a coin and roll a die. What is the probability of obtaining:
   (a) tails?
   (b) heads and an even number?
   (c) heads and a prime number?
   (d) tails and a five?
   (e) tails or a five?
   (f) a five?
3. You pick a single card from a standard deck (of 52 cards). What is the probability of picking:
   (a) the five of clubs?
   (b) a five?
   (c) a club?
   (d) a five or a club?
   (e) a one-eyed jack? (i.e., the jack of spades or the jack of hearts)
4. In the dice game of "craps," two dice are rolled.
   (a) If the player rolls a 7 or an 11 on the first roll, s/he wins. What is the probability of winning on the first roll?

(b) If the player rolls a 2, a 3 or a 12 on the first roll, s/he loses. What is the probability of losing on the first roll? (Note: there is more to this game than just the first roll, just for your information, but to ask other questions about it requires more probability than is covered in this section.)

5. Suppose it was known there was going to be an earthquake in Harrisonburg sometime this semester. What is the probability that it will occur when you are sitting in MATH 103 class? (Assume you go to all the classes during the 15 weeks, so you are in class 2.5 hours per week.)

1a. $\{h,t\} \times \{h,t\} \times \{h,t\}$. It consists of all triples (x,y,z) where each of x, y, and z is either a "h" or a "t". The sample space has $2 \cdot 2 \cdot 2 = 8$ elements.
1b. (t,h,h). There are seven others.
1c. The probability of each outcome is $\frac{1}{8}$.
1d. An event that is not an outcome must consist of either zero outcomes ($\emptyset$) or more than one outcome. For example, here is an event: The first two coins come up "heads."
1e. Since my event contains $\{(h,h,h),(h,h,t)\}$, its probability is $\frac{2}{8} = \frac{1}{4}$.

2a. $\frac{1}{2}$
2b. $\frac{1}{4}$
2c. $\frac{1}{4}$
2d. $\frac{1}{12}$
2e. $\frac{7}{12}$ (Note: $E = \{(T1,T2,T3,T4,T5,T6,H5\}$.)
2f. $\frac{1}{6}$

3a. $\frac{1}{52}$
3b. $\frac{1}{13}$
3c. $\frac{1}{4}$
3d. $\frac{4}{13}$
3e. $\frac{1}{26}$

4a. $\frac{2}{9}$
4b. $\frac{1}{9}$

5. There are $15 \cdot 7 \cdot 24 = 2520$ hours during a 15-week semester. You are in class for $2.5 \cdot 15 = 37.5$ hours. So, the probability is $\frac{37.5}{2520} = 0.01489$, or about 1.5%.