Finite Math Section 7_1
Solutions and Hints

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for the book:
Finite Mathematics, 7th Edition
by S. T. Tan.

DO NOT PRINT THIS OUT AND TURN IT IN !!!!!!!!
This is designed to assist you in the event you get stuck.
If you do not do the work you will NOT pass the tests.

Section 7.1:
For this section you should know some definitions and stuff:

1. An **experiment** is any activity with observable results.

2. The **sample space** of an experiment is the set of all possible outcomes of the experiment.
   Often these events are labeled with letters. For example the book will often say that experiment 1 has 4 possible outcomes: a, b, c and d. So the sample space would be { a, b, c, d }.

3. An **event** is a subset of possible outcomes of an experiment
   (i.e. a set of stuff that happened (or didn't) when the experiment was performed.)

4. Events can be thought of as sets – so union and intersection and complement apply to them. For example if E is an event (i.e. E is a set of possible results of an experiment) then E^C is the complement of E (i.e. E^C is the set of all other possible outcomes not covered by E)

5. Let E and F be events (outcomes). E and F are **mutually exclusive** if $E \cap F = \varnothing$.
   (i.e. none of the outcomes listed in E are found listed in F)

The tree diagrams have often been useful to students in understanding this material.

Problems 7 to 14:
Remember Events are just sets – the same rules apply when finding the intersection, union and complements.

For 11 and 12 remember if the intersection of the two events (sets) is empty then the two events are mutually exclusive.

Problems 24:
Let S = { 1, 2, 3 } be a sample space associated with an experiment.

a. List all events of this experiment.

There are a total of 8 possible events (subsets):

$\varnothing$

{1}, {2}, {3}
{1, 2}, {1, 3}, {2, 3}
{1, 2, 3}

b. How many subsets of S contain the number 3 ?

Looking at the list of events in part (a) we see
there are **four** subsets containing 3:
{3}, { 1, 3}, {2, 3} and {1, 2, 3}

c. How many subsets of S contain either the number 2 or the number 3 ?

Notice this question says EITHER 2 OR 3 (implying NOT both).
Again looking at the answer to part (a) we see
there are **four** subsets containing either 2 or 3:
{2}, {1, 2} and {3}, {1, 3}

Problems 26:
An experiment consists of selecting a letter at random from the letters in the word MASSACHUSETTS and observing the outcomes.

a. What is an appropriate sample space for this experiment?

The sample space is the set of all possible outcomes.
Notice there would be no way to tell if the first or the second S was selected, so the outcomes are just how many unique letters are in the word MASSACHUSETTS:

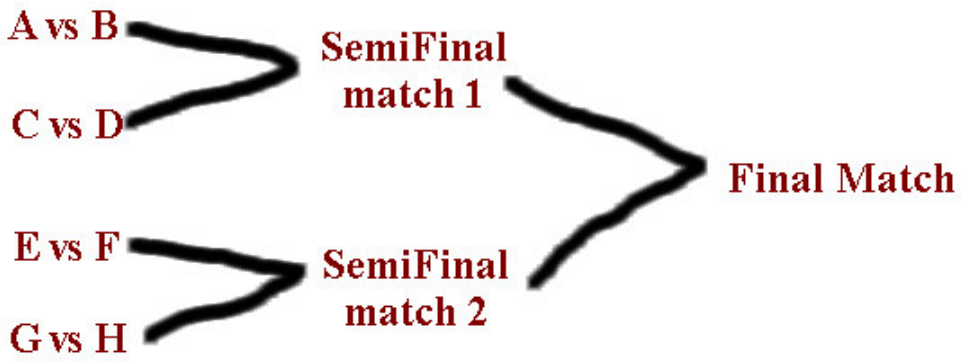
{M, A, S, C, H, U, E, T}

b. Describe the event "the letter selected is a vowel."

This event would be just the possible vowels selected from the word MASSACHUSETTS:

{A, U, E}

Problems 42:
Eight players, A, B, C, D, E, F, G and H are competing in a series of elimination matches of a tennis tournament in which the winner of each preliminary match will advance to the semifinals and the winner of the semifinals will advance to the finals. An outline of the scheduled matches follows below. Describe a sample space listing the possible participants in the finals.



To solve this we need to find all the possibilities of who MIGHT play who in the final match.

First we will see who could play who in the semi-final match 1:
A vs. C, A vs. D, B vs. C, or B vs. D
So we see any of the four (A, B, C or D) could advance to the final match – however ONLY one of them will (so A could NOT play D in the finals).

In semi-final match2 we could have
E vs. G, E vs. H, F vs. G or F vs. H.
Again we see any ONE of the four (E, F, G or H) could advance to the final match.

Notice from the above the list of possible participants in the final is simply all the people who are playing at the start: { A, B, C, D, E, F, G, H }.
And the question asks for a sample space listing all the possible participants in the finals, so technically the above is the correct answer.
HOWEVER that seems a bit trivial. Most likely the expected answer is a sample space listing who could play who in the finals (which is given below).
You should consult with your instructor to see which answer the think is the intended correct one. My general opinion is the one below is the complete answer to the intended question.

Thus in the final match we could have:

{ A vs. E, A vs. F, A vs. G, A vs. H
B vs. E, B vs. F, B vs. G, B vs. H
C vs. E, C vs. F, C vs. G, C vs. H
D vs. E, D vs. F, D vs. G, D vs. H }

So there are 16 possible final matches. And the above listing is the sample space.