Math 10 - Homework Chapter 4

1. A student has a 90% chance of getting to class on time on Monday and a 70% chance of getting to class on time on Tuesday. Assuming these are **independent** events, determine the following probabilities:

   a. The student is on time both Monday and Tuesday.

   b. The student is on time at least once (Monday or Tuesday).

   c. The student is late both days.

2. A class has 10 students, 6 females and 4 males. 3 students will be sampled without replacement for a group presentation.

   a. Construct a tree diagram of all possibilities (there will be 8 total branches at the end)

   b. Find the following probabilities:

      i. All male students in the group presentation.

      ii. Exactly 2 female students in the group presentation.

      iii. At least 2 female students in the group presentation.

3. 20% of professional cyclists are using a performance enhancing drug. A test for the drug has been developed that has a 60% chance of correctly detecting the drug(true positive). However, the test will come out positive in 2% of cyclists who do not use the drug (false positive).

   a. Construct a tree diagram where the first set of branches are cylcists with and without the drug, and the 2^{nd} set is whether or not they test positive.

   b. From the tree diagram create a contingency table.

   c. What percentage of cyclists will test positive for the drug?

   d. If a cyclist tests positive, what is the probability that the cyclist really used the drug?

4. We wish to determine the morale for a certain company. We give each of the workers a questionnaire and from their answers we can determine the level of their morale, whether it is 'Low', 'Medium ' or 'High'; also noted is the 'worker type' for each of the workers. For each worker type, the frequencies corresponding to the different levels of morale are given below.

WORKER MORALE

Worker Type	Low	Medium	High
Executive	1	14	35
Upper Management	5	30	65
Lower Management	5	40	55
Non-Management	354	196	450

a. We randomly select 1 worker from this population. What is the probability that the worker selected

- is an executive?
- is an executive with medium morale?
- is an executive or has medium morale?
- is an executive, given the information that the worker has medium morale.

b. Given the information that the selected worker is an executive, what is the probability that the worker

- has medium morale?
- has high morale?

c. Are the following events independent or dependent? Explain your answer:

- is an executive', 'has medium morale', are these independent?
- is an executive', 'has high morale', are these independent?