College Mathematics

review for Test 5: probability and decision-making

You should be able to do the following things:

Know and use that the classical definition of probability: \[
\text{probability} = \frac{\text{number of desirable outcomes}}{\text{number of possible outcomes}}
\]

Write out the list of all possible outcomes for situations involving "either-or" options (heads/tails, boy/girl, true/false, etc.) by using a tree diagram if needed.

Calculate probabilities of compound events involving "or" by adding probabilities and subtracting the probability of the "overlap".

Calculate probabilities of compound events involving "and" by multiplying probabilities.

Calculate the probability of a complementary event ("not").

Understand that "at least one" means "one or more", so NOT "at least one" means "none". Apply this to calculate the probability of some event occurring "at least once".

Given a description of a set subdivided along two different conditions and (four) known values, use a two-way table or a Venn diagram to calculate the number of items in any subset.

Apply the two-way inclusion-exclusion principle: \[#(A) + #(B) - #(A \text{ AND } B) = #(A \text{ OR } B)\].

Given the probability of each outcome and the value associated with each outcome, calculate the expected value. Describe and discuss the "long run" interpretation of probability and expectation.

Convert "odds in favor of" an event into the probability of the event.
Convert "odds against" an event into the probability of the event.

Given the “odds in favor of” or the “odds against” winning a game, the value associated with “winning” the game, and the cost of playing the game, calculate the expected value of the game.

Construct a two-way table or a tree diagram and use it to calculate a conditional probability. Remember, for conditional probability, the set of possible outcomes has been restricted from what was originally available. This can dramatically change the probability.

Calculate the number of possible outcomes using the multiplication principle in situations with or without repetition.

Calculate the number of arrangements (permutations) of objects selected from a set of objects.

Calculate the number of combinations of objects selected from a set of objects.