***Probability Rules***

A sample space contains all the possible outcomes observed in a trial of an experiment, a survey, or some random phenomenon.

• The sum of the probabilities for all possible outcomes in a sample space is 1.

• The probability of an outcome is a number between 0 and 1 inclusive. An outcome that always happens has probability 1. An outcome that never happens has probability 0.

• The probability of an outcome occurring equals 1 minus the probability that it doesn’t occur.

• The probability that two mutually exclusive (disjoint) events occur is 0.

***Strategies for solving probability problems:***

***Draw a picture of the situation***

• Use a chart, table, tree diagram, Venn Diagram, normal curve

***When is a binomial distribution appropriate?***

• If there are exactly 2 outcomes, usually designated success and failure, for each trial.

• If the number of trials is fixed.

• If the trials are independent.

• If the probability of success is the same for each trial.

***When is a geometric distribution appropriate?***

• If there are exactly 2 outcomes for each trial.

• If the trials are independent.

• If the probability of success is the same for each trial.

• If there is not a fixed number of trials. The trials continue until a success/failure is achieved.

***When is a normal distribution appropriate?***

• If the data is modeled by a continuous distribution and is given as normal or the sample size is large enough (second semester topic).

• If the data is modeled by a binomial distribution and and are large enough. *np and n(1-p)*

***What steps are needed if a simulation is appropriate?***

• Model the component of interest in the problem with some chance mechanism.

• State any assumptions being made (usually independent trials and constant probability).

• Describe how the simulation will be run. If using random digits, be sure to state whether duplicates are allowed. Be sure to give a stopping rule.

• Conduct the simulation with a reasonable number of replications.

• State the conclusion reached in the context of the problem.

