QR 26: Choice and Chance
The Mathematics of Decision Making

Unit IV Activity **Name:_____**

1. You have the choice between two alternatives, A1 and A2.
   - A1 yields a certain payoff of $1 million.
   - A2 yields payoffs of $5 million, $ 1 million, and $0 with probabilities of .10, .89, and .01 respectively.

   Which alternative do you prefer? (Check one.)

2. You have the choice between two alternatives A3 and A4.
   - A3 yields payoffs of $5 million and $0 million with probabilities of .10 and .90 respectively.
   - A4 yields payoffs of $1 million and $0 with probabilities .11 and .89 respectively.

   Which alternative do you prefer? (Check one.)

4. Imagine an urn containing a large number of identically shaped white balls and suppose each ball has a pair of payoffs such as ($5 million, $1 million). We'll say the left payoff is $5 million, and the right payoff is $1 million. The balls are identical except for their payoffs. Now imagine that you must first choose Left or Right, and then draw a ball at random from the urn. Your payoff depends on your choice of Left or Right and on the ball you pull out. Before you choose Left or Right you have the privilege of studying all the balls in the urn and recording anything you want and making any calculations you want, if any, before you decide. Let's say in a specific case, after you study the pairs of numbers on the balls, you decide on Left.

   Now we introduce a new ball, an orange-colored one of identical shape and texture to the white ones, but with *identical left and right payoffs* and we put this orange ball in the urn. The desirability of saying Left or Right and drawing a ball from this newly constituted urn might change but *would your preferred choice of Left change? Briefly justify your answer.*

5. An urn contains 50 red and 50 white poker chips. You must announce a color, red or white, and then draw a chip at random. If you match, you get $100, otherwise nothing. *How much is this option worth to you? Briefly justify your answer.*

6. An urn contains an unknown number of red and white chips. You don't have the foggiest idea of the number of chips or the relative numbers of red or white chips. You must announce a color - red or white - and then draw a chip at random. If you match, you get $100, otherwise nothing. *How much is this option worth to you? Briefly justify your answer.*

7. For each of the expressions listed below, assign a numerical probability that best reflects its meaning to you:

   a. there's a *fair chance* that : _____
   b. it is *not unlikely* that: _____
   c. it is *beyond a reasonable doubt* that: _____
   d. there's a *pretty good chance* that: _____
   e. there's *some chance* that : _____