| Objective | Constraints and Assumptions | Concept or Tool | Equations and Algorithms |
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| Find the probability of an outcome. | * The outcome is a discrete random variable. * There are a fixed number of trials (n). * Each trial has only two possible outcomes. * The probability of success (p) is the same for each trial. * The outcome of one trial does NOT influence the outcome of any other trial. | Binomial distribution  Use the normal distribution to approximate the binomial distribution if both of the following are true:   * (n)(p) 10 * (n)(1-p) 10 | 1. Locate the binomial table associated with the value of n. 2. Find the column that represents p. 3. Find the row that represents the number of successes. 4. The intersection of the row and column provides the probability of x successes, p(x). |
| Find the probably for an outcome greater than some specific value.  Find the probably for an outcome less than some specific values.  Find the probably for an outcome between two specific values. | * The outcome is a discrete random variable. * There are a fixed number of trials (n). * Each trial has only two possible outcomes. * The probability of success (p) is the same for each trial. * The outcome of one trial does NOT influence the outcome of any other trial. | Binomial distribution  Use the normal distribution to approximate the binomial distribution if both of the following are true:   * (n)(p) 10 * (n)(1-p) 10 | Add the probabilities of the individual values.  For n=3  p(1≤x≤3)=p(1)+p(2)+p(3)  p(x>1)=p(2)+p(3) |
| Find the mean, variance, and standard deviation for a specific outcome. | * The outcome is a discrete random variable. * There are a fixed number of trials (n). * Each trial has only two possible outcomes. * The probability of success (p) is the same for each trial. * The outcome of one trial does NOT influence the outcome of any other trial. | Binomial distribution  Use the normal distribution to approximate the binomial distribution if both of the following are true:   * (n)(p) 10 * (n)(1-p) 10 | Mean of X is μ=np  Variance of X is  σ2=np(1-p)  Standard deviation of X is σ = |
| Find the probability of an outcome.  Compare numbers from different distributions. | * The probability of a random outcome has a normal distribution. * The outcome is a continuous random variable. * The mean and standard deviation are known. | Normal distribution  Standard normal distribution (Z) | Any normal distribution can be converted to a Z-distribution.  Z-value represents the number of standard deviations above or below the mean.  z =  x = μ + zσ  Probabilities on Z-table represent the area under the curve to the left of the value. |
| Find the value of X given the percentage or probability of X  Find the pth percentile for X {Find a where p(X<a)=p}  Find the (1-p)th percentile for X {Find b where p(X>b)=p which is rewritten as p(X<b)=1-p. | * The probability of a random outcome has a normal distribution. * The outcome is a continuous random variable. | Normal distribution  Standard normal distribution (Z) | Any normal distribution can be converted to a Z-distribution.  Z-value represents the number of standard deviations above or below the mean.  z =  x = μ + zσ  Probabilities on Z-table represent the area under the curve to the left of the value. |
| Approximate the binomial distribution when the number of trials (n) is large. | * (n)(p) 10 * (n)(1-p) 10 | Normal distribution  Standard normal distribution (Z) | μ = np  σ = |