**Descriptive Statistics**

|  |  |
| --- | --- |
| **Measure** | **Excel Formula** |
| Count | =COUNT(<data range>) |
| Sum | =SUM(<data range>) |
| Count if <criteria> is true | =COUNTIF(<data range>, “*criteria*”) |
| Count if <criteria range> is true | =COUNTIFS(<data range>, “>=*criteria*”, <data range>, “<*criteria*”) |
| Mean | =MEAN(<data range>) |
| Sample Variance | =VAR.S(<data range>) |
| Sample Standard Deviation | =STDEV.S(<data range>) |
| Population Variance | =VAR.P(<data range>) |
| Population Standard Deviation | =STDEV.P(<data range>) |
| Median | =MEDIAN(<data range>) |
| Minimum | =MIN(<data range>) |
| First quartile (Q1, 25th percentile) | =QUARTILE.EXC(<data range>, 1) |
| Second Quartile (Q2, 50th percentile, median) | =QUARTILE.EXC(<data range>, 2) |
| Third quartile (Q3, 75th percentile) | =QUARTILE.EXC(<data range>, 3) |
| Maximum | =MAX(<data range>) |
| Range | =MAX(<data range>) - MIN(<data range>) |
| Interquartile Range | =QUARTILE.EXC(<data range>, 3) – QUARTILE.EXC(<data range>, 1) |
| Percentile | =PERCENTILE.EXC(<data range>, *percentile*) |
| Percent Rank | =PERCENTRANK.EXC(<data range>, *data value*) |
| Standardize | =STANDARDIZE(x, mean, standard deviation) |
| Covariance | =COVARIANCE.S(<data range 1>, <data range 2>) |
| Correlation | =CORREL(<data range 1>, <data range 2>) |

## Binomial, Poisson, and Normal Probabilities

|  |  |  |
| --- | --- | --- |
| **Measure** | **Formula** | **Excel Formula** |
| Binomial Probability |  | =BINOM.DIST(k, n, p, 1) 🡪 cumulative  =BINOM.DIST(k, n, p, 0) 🡪 exact |
| Poisson Probability |  | =POISSON.DIST(k, µ, 1) 🡪 cumulative  =POISSON.DIST(k, µ, 0) 🡪 exact |
| Standard Normal |  | =NORM.S.DIST(z, 1)  =NORM.S.INV(probability) 🡪 Reverse Lookup |
| Normal |  | =NORM.DIST(x, mean, standard deviation, 1)  =NORM.INV(probability, mean, standard deviation) 🡪 Reverse Lookup |

## Sampling Distributions

| **Measure** | **Formula for Proportions** | **Formula for Means** |
| --- | --- | --- |
| Expected Value |  |  |
| Standard Error |  |  |
| Z, standard normal value when is known |  |  |
|  |  |  |
| **Measure** | **Formula** | |
| Standard Normal: Z scores and Probability | =NORM.S.DIST(z, 1)  =NORM.S.INV(probability) | |
| Normal: X Values and Probability | =NORM.DIST(x, mean, standard deviation, 1)  =NORM.INV(probability, mean, standard deviation) | |

## Confidence Intervals and Hypothesis Testing

|  |  |  |
| --- | --- | --- |
| **Measure** | **Formula for Proportions** | **Formula for Means** |
| Standard Error |  |  |
| Critical Value | or | or |
| Margin of Error (ME) |  |  |
| Test Statistic |  |  |
|  |  |  |
| **Measure** | **Excel Formula** | |
| Standard Normal: Z scores and Probability | =NORM.S.DIST(z, 1)  =NORM.S.INV(probability) | |
| T Distribution: T scores and Probability | =T.DIST(t, df, 1)  =T.DIST.2T(t, df)  =T.DIST.RT(t, df)  =T.INV.2T(probability, df)  =T.INV(probability, df) | |

## Simple Linear Regression

|  |  |
| --- | --- |
| **Measure** | **Formula** |
| Correlation |  |
| Slope |  |
| Intercept |  |
|  |  |
| **Measure** | **Excel Formula** |
| Covariance | =COVARIANCE.S(<data range>, <data range>) |
| Correlation | =CORREL(<data range>, <data range>) |
| Slope | =SLOPE(<y data range>, <x data range>) |

## Sampling Distributions with CLT

| **Measure** | **Formula for Proportions** | **Formula for Means** |
| --- | --- | --- |
| Central Limit Theorem | For any population proportion , the sampling distribution of is **approximately normal if the sample size n is sufficiently large**. As a general guideline, the normal distribution approximation is justified when **and** . | For any population mean , the sampling distribution of is **approximately normal if the sample size n is sufficiently large**.   * If a population is known to be normally distributed, the sampling distribution of the sample mean is normally distributed for **any sample size n**. * If a population is known to be normally distributed, the sampling distribution of the sample mean is normally distributed for a **sample size n > 30**. |
| Expected Value |  |  |
| Standard Error |  |  |
| Z, standard normal value when is known |  |  |
|  |  |  |
| **Measure** | **Formula** | |
| Standard Normal: Z scores and Probability | =NORM.S.DIST(z, 1)  =NORM.S.INV(probability) | |
| Normal: X Values and Probability | =NORM.DIST(x, mean, standard deviation, 1)  =NORM.INV(probability, mean, standard deviation) | |