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ARGO FUNCTIONS CHEAT SHEET

OP, RTA, AND VAL FUNCTIONS

OP FUNCTIONS – These functions all start with 'op' and are designed to retrieve raw data or statistics from cells that have distributions or results defined in them.

Op(Distribution): returns the probability distribution samples as an array. Distribution is an Argo probability distribution or Results. Deprecated – use OpData instead.

opAveDev(Distribution): returns the average of the absolute deviations of the probability distribution samples from their average. Distribution is an Argo probability Distribution or Result

opAverage(Distribution): returns the average of the probability distribution samples.

opCorr(Distribution, Distribution, Type[OPTIONAL]): returns the correlation coefficient between two probability distribution samples. Both Distribution parameters are Argo probability distributions or results. Type specifies the correlation method; True = Pearson (linear), False = Spearman (rank). Defaults to True if omitted.

opCorrMat(Distributions, Type[OPTIONAL]): returns the matrix of correlation coefficients for two or more probability distributions. Distribution is an Argo probability Distribution or Result. Type specifies the correlation method; True = Pearson (linear), False = Spearman (rank). Defaults to True if omitted.

opCorrMatAdjusted(Matrixdefinition): returns the adjusted rank correlation matrix. Returned matrix represents the nearest valid matrix to the defined matrix. The returned matrix will equal defined matrix if defined matrix is valid. Matrixdefinition is a cell containing a RtaCorrMatDefine formula.

opCount(Distribution): returns the count of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opCV(Distribution): returns the coefficient of variation of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opData(Distribution, Orientation[OPTIONAL]): returns the probability distribution samples as an array. Distribution is an Argo probability Distribution or Result. Orientation determines the orientation of the return array; True returns column array, False returns row array. True if omitted

opExpGain(Distribution): returns the average of all values greater than 0 then multiplies the product by 1 – (percentage from 0) among all data. Distribution is an Argo probability Distribution or Result.

opExpGainRatio(Distribution): returns the semi variance of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opExpLoss(Distribution): returns the average of all values less than 0 then multiplies the product by 1 – (percentage from 0) among all data. Distribution is an Argo probability Distribution or Result.

opExpLossRation(Distribution): returns the expected loss ratio for a specified indefinite function. Distribution is an Argo probability Distribution or Result.

opExpValMargin(Distribution): returns ExpGainRatio – ExpLoss Ratio. Distribution is an Argo probability Distribution or Result.

opFrequency(Distribution): returns how often samples of the probability distribution occur within a range of values. Distribution is an Argo probability Distribution or Result. Bin is an array of, or reference to, intervals to group the probability distribution's samples.

opKurt(Distribution): returns the kurtosis of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opMax(Distribution): returns the max of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opMedian(Distribution): returns the median of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opMin(Distribution): returns the min of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opMode(Distribution): returns the mode of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opPercentile(Distribution): returns the kth percentile of the probability distribution samples. Distribution is an Argo probability Distribution or Result. K is the kth percentile value; must be a value between 0 and 1

opPercentInterval(Distribution, Lower, Upper): returns the percentage of the distribution that falls in the provided range (Lower <= x <= Upper). Distribution is an Argo probability Distribution or Result. Lower is the lower value of the range. Upper is the upper value of the range.

opPercentRank(Distribution, X): returns the rank of a value in a probability distribution's samples as a percentage of the samples. Distribution is an Argo probability Distribution or Result. X is the value in question.

opRange(Distribution): returns the range of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opSemiDev(Distribution, Target, Downside[OPTIONAL]): returns the semi deviation of the probability distribution samples. Distribution is an Argo probability Distribution or Result. Target is the threshold delineating the scenarios that represent a risk. Downside is whether the scenario of interest is below the target; True if below, False if above. Defaults to True if omitted.

opSemiVar(Distribution, Target, Downside[OPTIONAL]): returns the semi variance of the probability distribution samples. Distribution is an

Argo probability Distribution or Result. Target is the threshold delineating the scenarios that represent a risk. Downside is whether the scenario of interest is below the target; True if below, False if above. Defaults to True if omitted.

opSigmaCP(Distribution, Lower, X): returns the capability of the process around a target value. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. X is the largest number that can belong to the different classes.

opSigmaCPK(Distribution, Lower, Upper): returns what the process is capable of producing if the process mean is not centered between the lower and upper limits. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes.

opSigmaCPKLower(Distribution, Lower): returns the one-sided Process Capability Index based on the lower specified limit. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes.

opSigmaCPKUpper(Distribution, Upper): returns the one-sided Process Capability Index based on the upper specified limit. Distribution is an Argo probability Distribution or Result. Upper is the largest numbers that can belong to the different classes.

opSigmaCPM(Distribution, Lower, Upper, Target): returns the capability of the process around a target value. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to different classes. Target is the target value.

opSigmaDefectPPM(Distribution, Lower, Upper): returns the Defective Parts per Million. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes.

opSigmaDefectShiftPPM(Distribution, Lower, Upper, Shift): returns the Defective Parts per Million with an added shift. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes. Shift is the shift value.

opSigmaDefectShiftPPMLower(Distribution, Lower, Shift): returns the Defective Parts per Million with a shift below the lower specified limit. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. . Shift is the shift value.

opSigmaDefectShiftPPMUpper(Distribution, Upper, Shift): returns the Defective Parts per Million with a shift above the upper specified limit. Distribution is an Argo probability Distribution or Result. Upper is the largest numbers that can belong to the different classes. Shift is the shift value.

opSigmaK(Distribution, Lower, Upper): returns the measure of the distribution center. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes.

opSigmaLowerbound(Distribution, N): returns the lower bound as a specific number of standard deviations below the mean. Distribution is an Argo probability Distribution or Result. N is the number of standard deviations.

opSigmaProbDefectShift(Distribution, Lower, Upper, Shift): returns the Probability of Defect with a shift outside of the upper and lower limits. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes. Shift is the shift value.

opSigmaProbDefectShiftLower (Distribution, Lower, Shift): returns the Probability of Defect, with a shift, outside of the lower limit. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Shift is the shift value.

opSigmaProbDefectShiftUpper (Distribution, Upper, Shift): returns the Probability of Defect, with a shift, outside of the upper limit. Distribution is an Argo probability Distribution or Result. Upper is the largest numbers that can belong to the different classes. Shift is the shift value.

opSigmaSigmaLevel(Distribution, Lower, Upper, Shift): returns the Process Sigma Level with a shift. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes. Shift is the shift value.

opSigmaUpperbound(Distribution, N): returns the upper bound as a specific number of standard deviations above the mean. Distribution is an Argo probability Distribution or Result. N is the number of standard deviations.

opSigmaYield(Distribution, Lower, Upper, Shift): returns the Six Sigma Yield, with a shift, or the fraction of the process that is free of defects. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes. Shift is the shift value.

opSigmaZLower(Distribution, N): returns the number of standard deviations of the process that the lower limit is below the mean of the process. Distribution is an Argo probability Distribution or Result. N is the number of standard deviations.

opSigmaZMin(Distribution, Lower, Upper): returns the minimum of opSigmaZLower and opSigmaZUpper. Distribution is an Argo probability Distribution or Result. Lower is the smallest numbers that can belong to the different classes. Upper is the largest numbers that can belong to the different classes.

opSigmaZUpper(Distribution, N): returns the number of standard deviations of the process that the upper limit is above the mean of the process. Distribution is an Argo probability Distribution or Result. N is the number of standard deviations.

opSkew(Distribution): returns the skewness of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opStDev(Distribution): returns the standard deviation of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

opVar(Distribution): returns the variance of the probability distribution samples. Distribution is an Argo probability Distribution or Result.

RTA FUNCTIONS – These functions all start with 'Rta' and are used to define probability distributions in Argo.

RtaBernoulli(Likelihood, Impact[OPTIONAL]): generates a distribution where a single even having effect 'Impact' occurring with chance 'Likelihood'. Likelihood is the likelihood of success for a single event (between 0.0 and 1.0 inclusive). Impact is the impact of the event. Impact is optional and defaults to 1.0

RtaBeta(Alpha, Beta, Min[], Max[OPTIONAL]): generates a continuous probability distribution often applied to modeling proportions and percentages. Alpha is a shape parameter, greater than 0.0. Beta is a shape parameter, greater than 0.0. Min is the minimum value in the distribution. Min is optional and defaults to 0.0. Max is the minimum value in the distribution. Max is optional and defaults to 1.0.

RtaBetaPert(Min, Mode, Max): generates a continuous probability distribution for the ease of modeling expert opinion. Min is the minimum value in the distribution. Mode is the most likely value in the distribution. Max is the maximum value in the distribution.

RtaBinomial(Trials, Likelihood): generates a discrete probability distribution for the number of successes in a sequence of independent Bernoulli experiments. Trials is the number of experiments in the sequence of experiments. Likelihood is the likelihood of success for a single experiment (between 0.0 and 1.0 inclusive)

RtaCauchy(Location, Scale): generates a continuous distribution that is often used to model the ratio of two independent standard normal random variables. Location is the location of the peak of the distribution. Scale is the dispersion of the distribution (greater than 0.0).

RtaChiSquared(Dof): generates a continuous distribution that is often used to model a sum of the squares of 'Dof' independent standard normal random variables. Dof (degrees of freedom) is the number of sum of squares modeled by this distribution (integer greater than 0)

RtaCorrMatDefine(MatrixRange, MatrixName, LowerTriangular): Defines a rank correlation matrix and returns matrix name if input is a valid correlation matrix. If input is not valid, the nearest valid matrix is automatically determined and applied in the model. MatrixRange is an excel range containing rank correlation coefficients. MatrixName is a unique name for the matrix. LowerTriangular is True is the matrix is lower triangular and False otherwise. Lower Triangular is optional and defaults to True if omitted.

RtaExponential(Rate): generates a continuous distribution often used to model the time between events in a poisson process. Rate is the inverse scale parameter specifying the dispersion of the distribution (greater than 0.0).

RtaExtremeValue(Location, Scale): generates a continuous distribution often used to model the limit distribution of maxima of a sequence of independent, identically distributed (i.i.d.) random variables. Location is the location of the peak of the distribution. Scale is the dispersion of the distribution (greater than 0.0)

RtaFisherF(Dof1, Dof2): generates a continuous distribution often used to model the ratio of two independent chi squared random variables. Dof1 is the degrees of freedom of the numerator chi squared random variable (integer greater than 0). Dof2 is the degrees of freedom of the denominator chi squared random variable (integer value greater than 0)

RtaGamma(Alpha, Beta): generates a continuous probability distribution often applied to modeling waiting times. Alpha is the shape parameter (greater than 0.0). Beta is the scale parameter specifying the dispersion of the distribution (greater than 0.0)

RtaGeometric(Likelihood): generates a discrete probability distribution often used to model the number of Bernoulli experiments needed to achieve one success. Likelihood is the likelihood of success for a single experiment (between 0.0 and 1.0)

RtaHypergeometric(Population Successes, Draws, Population Size): generates a discrete probability distribution that describes the probability of k successes in n draws without replacement from a finite population of size N containing exactly K successes. Population Successes is the number of successes in population. Draws is the size of the sample taken from the population. Population Size is size of the population.

RtaInvChiSquared(Dof, Scale[OPTIONAL]): generates a continuous probability distribution of a random variable whose multiplicative inverse has a chi-squared distribution. Dof is the degrees of freedom of the chi-squared distribution (integer greater than 0). Scale is the dispersion of the distribution (greater than 0.0). Scale is optional and defaults to 1/Dof is omitted.

RtaInvGamma(Alpha, Beta): generates a continuous probability distribution of a random variable whose multiplicative inverse has a gamma distribution. Alpha is the shape parameter (greater than 0.0). Beta is the measure of dispersion of the distribution (greater than 0.0).

RtaInvNormal(Mean, Scale): generates a continuous probability distribution of a random variable that describes the distribution of the time a Brownian Motion with positive drift takes to reach a fixed positive level. Mean is the mean of the distribution. Scale is the measure of dispersion of the distribution (greater than 0.0).

RtaLaplace(Location, Scale): generates a continuous distribution often used to model the difference between two independent, identically distributed (i.i.d.) exponential random variables. Location is the location of the peak of the distribution. Scale is the measure of dispersion of the distribution (greater than 0.0).

RtaLogistic(Location, Scale): generates a continuous distribution with cumulative distribution function (CDF) equal to the logistic function; resembles the normal distribution in shape but has heavier tails. Location is the location of the peak of the distribution. Scale is the measure of dispersion of the distribution (greater than 0.0).

RtaLogNormal(Mean, StDev): generates a continuous probability distribution of a random variable whose logarithm is normally distributed. Mean is the mean of the distribution. StDev is the dispersion of the distribution (greater than 0.0).

RtaNegBinomial(Successes, Likelihood): generates a discrete probability distribution of a random variable that models the number of successes in a sequence of Bernoulli experiments before a specified number of failures occurs. Successes is the total number of successes (integer greater than 0). Likelihood is the likelihood of success for a single experiment (between 0.0 and 1.0).

RtaNonCentralBeta(Alpha, Beta, Lambda): generates a continuous distribution defined as the ratio $X = \frac{\chi_m^2(\lambda)}{\chi_m^2(\lambda)+\chi_n^2}$ where $\chi_m^2(\lambda)$ is a noncentral χ^2random variable with m degrees of freedom, and χ_n^2 is a central χ^2 random variable with n degrees of freedom. Alpha is the shape of the distribution (greater than 0.0). Beta specifies the dispersion of the distribution (greater than 0.0). Lambda is the non-centrality parameter (greater than 0.0).

RtaNonCentralChiSquared(Dof, Lambda): generates a continuous distribution that often arises in the power analysis of statistical tests in which the null distribution is a chi-squared distribution. Dof is the degrees of freedom (integer greater than 0). Lambda is the non-centrality parameter (greater than or equal to 0.0)

RtaNonCentralFisherF(Dof1, Dof2, Lambda): generates a continuous distribution of the test statistic in ANOVA where the null hypothesis is false. Dof1 is the degrees of freedom of the numerator chi squared random variable (integer > 0). Dof2 is the degrees of freedom of the denominator chi squared random variable (integer greater than 0). Lambda is the non-centrality parameter (greater than or equal to 0.0).

RtaNonCentralStudent(Dof, Lambda): generates a continuous distribution that is a generalization of the Students T Distribution. Dof is the degrees of freedom (integer greater than 0). Lambda is the non-centrality parameter (greater than or equal to 0.0).

RtaNormal(Mean, StDev): generates a symmetric continuous distribution that is often used to model the sum of many independent random variables. Mean is the mean parameter of the distribution. StDev is the measure of the dispersion of the distribution.

RtaPareto(Scale, Shape): generates a continuous power law distribution often used to describe the larger compared to the smaller. Scale is the dispersion of the distribution (greater than 0.0). Shape is the shape of the distribution (greater than 0.0).

RtaPoisson(Rate): generates a discrete distribution describing the probability of a given number of events occurring in a fixed interval of time and/or space if these events occur with a known average rate and independently of the time since the last event. Rate is the average rate of time between event occurrences.

RtaRayleigh(Sigma): generates a continuous distribution often used to model two orthogonal components that have an absolute value. Sigma is the shape parameter (greater than 0.0).

RtaResult(Function, Name): Argo function that captures the results of a function or cell value. Function is the function of a distribution, or another function that depends on a distribution. Name is the name that should be stored for this result. Name is optional and will be blank if omitted.

RtaSkewNormal(Location, Scale, Shape): generates a continuous distribution that is a variation of the normal distribution with a noncentrality parameter. Location is the location of the distribution (greater than 0.0). Scale specifies the dispersion of the distribution (greater than 0.0). Shape is the shape of the distribution (greater than 0.0).

RtaStudent(Dof): generates a continuous distribution that arises when estimating the mean of a normally distributed population in situations where the sample size is small and population standard deviation is unknown. Dof is the degrees of freedom (integer greater than 0).

RtaTriangular(Min, Mode, Max): generates a continuous probability distribution used for modeling expert opinion. Min is the minimum value in the distribution. Mode is the most likely value in the distribution. Max is the maximum value of the distribution.

RtaTriangularAlt(Min, Mode, Max, MinPercentile, MaxPercentile): generates a continuous probability distribution used for modeling expert opinion taking over- and under-estimation into consideration. Min is the minimum value in the distribution. Mode is the most likely value in the distribution. Max is the maximum value of the distribution. MinPercentile is the perceived percentile of the expert-provided minimum value. MaxPercentile is the perceived percentile of the expert-provided maximum value.

RtaTriGen(Min, Mode, Max, Captured-uncertainty): an alternative Triangular distribution; generates a continuous probability distribution used for modeling expert opinion taking over- and under-estimation into consideration. Min is the minimum value in the distribution. Mode is the most likely value in the distribution. Max is the maximum value of the distribution. Captured-uncertainty is the percentage of uncertainty captured between the min and max value (between 0.0 and 1.0).

RtaUniform(Min, Max): generates a continuous distribution that models all values in a range as equally likely. Min is the minimum value of the distribution. Max is the maximum value of the distribution.

RtaUniformDiscrete(Min, Max): generates a discrete distribution that models all values in a range as equally likely. Min is the minimum value of the distribution. Max is the maximum value of the distribution.

RtaWeibull(Shape, Scale): generates a continuous distribution often used to model failure rates that vary over time. Shape is the shape of the distribution (greater than 0.0). Scale is the dispersion of the distribution (greater than 0.0).

VAL FUNCTIONS – These functions all start with 'val' and are designed to change the behavior of the distribution or result functions in Argo.

ValCorrMatApply(MatrixDefinition, Position): an additional parameter that includes this distribution in a defined rank correlation matrix. MatrixDefinition is a cell containing a RtaCorrMatDefine formula. Position is this distribution's index in the rank correlation matrix.

ValLikelihood(Likelihood): an additional parameter that specifies the uncertain input's likelihood of occurrence. Likelihood is the likelihood that the uncertain input will occur (between 0.0 and 1.0).

ValLowerBound(Lowerbound): an additional parameter that specifies the uncertain input's lowerbound. Lowerbound is the real number lowerbound of the uncertain input.

ValName(Name): an additional parameter that specifies the uncertain input's name. Name is the name of the uncertain input.

ValPointEstimate(PointEstimate): an additional parameter that forces the RTA function to return a single value to the worksheet instead of a random draw. PointEstimate is the real number value to be returned by the function to the worksheet.

ValShift(Shift): an additional parameter that shifts the uncertain input's location along the unit axis. Shift is the real number value to shift the location of the uncertain input.

ValUpperBound(Upperbound): an additional parameter that specifies the uncertain input's upperbound. Upperbound is the real number upperbound of the uncertain input.