# Excel Functions for the Chi-Squared Distribution

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NOTE: The **.DIST** versions of each of the functions below will output probability as a function of percentage points (the "x-value", in other words) of the distribution. The **.INV** versions will output the x-value corresponding to probability. Most are left-tailed formulas and some are right-tailed formulas (usually indicated with a **.RT** at the end).
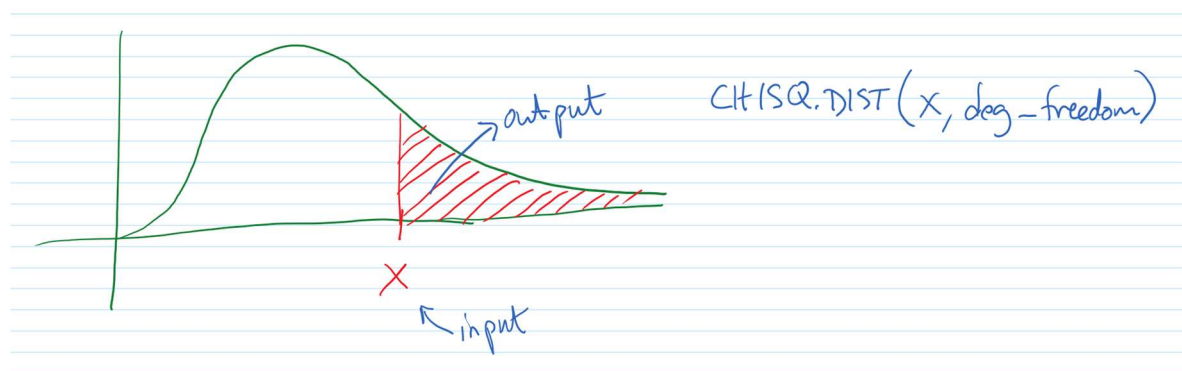
CHI SQUARED DISTRIBUTION

CHISQ.DIST(x,deg_freedom,cumulative) – Outputs the left-tailed cumulative probability (if **cumulative** = **TRUE**) of the chi squared distribution with **deg_freedom** degrees of freedom up to a value of **x**. If **cumulative** = **FALSE**, the function outputs the distribution function, f(x).
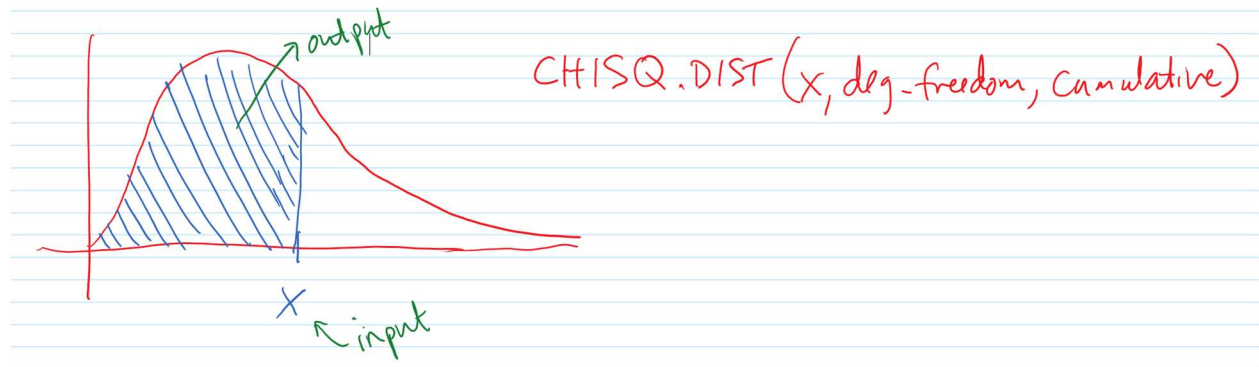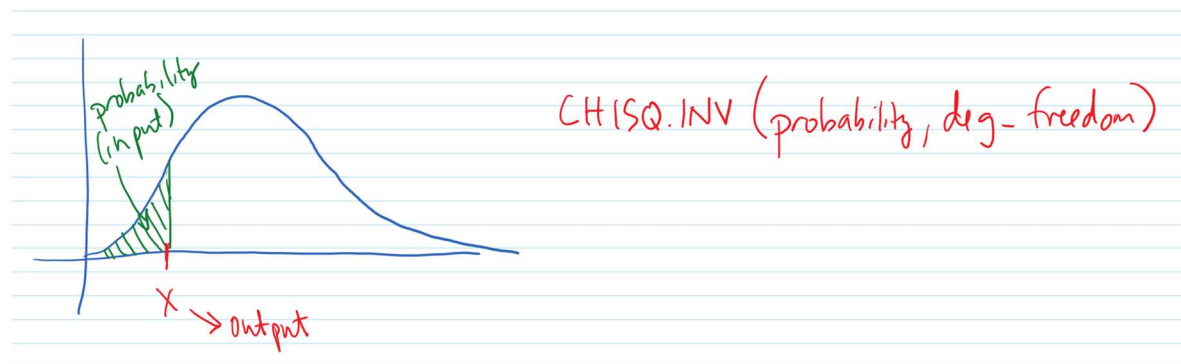

Example: The area to the left of x = 6.7 on the chi squared distribution with 9 degrees of freedom is: **=CHISQ.DIST(6.7,9,TRUE)** = 0.332

CHISQ.DIST.RT(x,deg_freedom) – Outputs the right-tailed probability (area) of the chi squared distribution with **deg_freedom** degrees of freedom.


Example: The area to the right of x = 10.2 under the chi squared distribution with 12 degrees of freedom is: **=CHISQ.DIST.RT(10.2,12)** = 0.598

CHISQ.INV(probability,deg_freedom) – Returns the x-value of the chi squared distribution based on **deg_freedom** degrees of freedom with area **probability** to the left.

Example: The x-value on the chi squared distribution with 7 degrees of freedom with 10% of the distribution to the left of it is: **=CHISQ.INV(0.1,7)** = 2.83

CHISQ.INV.RT(probability,deg_freedom) – Returns the x-value of the chi squared distribution based on **deg_freedom** degrees of freedom with area **probability** to the right. This function outputs the data in the "Percentage Points of the Chi Squared Distribution" table, available on the course site.
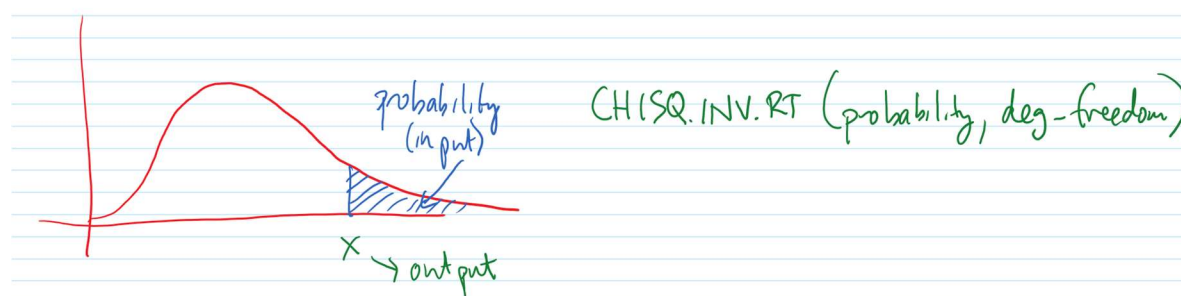
Example: The x-value of the chi squared distribution with 13 degrees of freedom that has 15% of the distribution to the right of it is: **=CHISQ.INV.RT(0.15,13)** = 18.2

Percentage Points of the Chi Squared Distribution

In setting up confidence intervals and hypothesis tests on the variance, we need to determine the parameter(s) χ^2_α, $\chi^2_{1-\alpha}$, $\chi^2_{\alpha/2}$, and/or $\chi^2_{1-\alpha/2}$. In order to calculate these "percentage points" of the chi squared distribution, we can use the **CHISQ.INV.RT** function in Excel, shown here for 8 degrees of freedom:

χ^2_α =**CHISQ.INV.RT(alpha,8)**

$\chi^2_{1-\alpha}$ =**CHISQ.INV.RT(1-alpha,8)** [note that this is also equivalent to **CHISQ.INV(alpha,8)**]

$\chi^2_{\alpha/2}$ =**CHISQ.INV.RT(alpha/2,8)**

$\chi^2_{1-\alpha/2}$ =**CHISQ.INV.RT(1-alpha/2,8)** [note that this is also equivalent to **CHISQ.INV(alpha/2,8)**]