**Using EXCEL Functions In Place of Probability Tables**

**Note: In versions of Excel after 2007, some of the function syntax has changed. They are given along with the older forms. Both forms work!**

**NORMSDIST (*z*)**: or **NORM.S.DIST (*z*)**

Both return the left tail probability associated with standard normal distribution z.

e.g., NORMSDIST (1.65) = .950529 -- the area under the z curve up to z=1.65 is 95%

**NORMSINV (*P*): or NORM.S. (*P*)**

Both return the z value such that left tail probability is *P*.

e.g., NORMSINV (0.05) = ‑1.64485-- about 5% of z values are smaller than ‑1.64485 (the left tail.)

**NORMDIST (*a, mu, sigma,* 1): or NORM.DIST (*a, mu, sigma,* 1)**

Both return the probability that *x* < = *a*, for a normal distribution with mean = *mu* standard deviation = *sigma.* e.g., NORMDIST (12, 5, 2, 1) = .999767. This is the probability that the random variable is less than or equal to 12 for a normal distribution with mean 5 and standard deviation 2. Note if the last argument is 0, it returns the height of the normal distribution at point *a.*

**NORMINV (*P, mu, sigma*): or NORM.INV (*P, mu, sigma***)

Both return a number, *x* such that the cumulative probability up to that number is equal to *P*,

*e.g*., NORMINV (0.3, 5, 2) = 3.950529. There is 30% probability that the random variable is 3.905529 or smaller for a normal distribution with mean 5, standard deviation 2.

**TDIST (*x, df, tails*): or T.DIST*(x, df, 1*)**

If *tails* = 1, returns the one-tail probability for *x*; if tails=2, returns the two-tail probability,

*e.g.,* TDIST (1.729, 19, 2) = .100024. The *t* distribution with 19 degrees of freedom has 10% of the values either less than –1.729 (left –tail) or greater than 1.729 (right-tail). TDIST (1.729, 19, 1) = .050012—one tail probability for *x* = 1.729 (exactly half of two-tail probability).

*The new version returns 1-the one-tail probability. For two tails double one-tail probability.*

**TINV (*P, df*) or T.INV.2T (*P, df*)**

Both return the *t*‑value with *df* degrees of freedom, for which the two tail probability is *P*.

*e.g*., TINV (0.05, 60) = 2.000297. With *df* = 60 *t* statistic is very close to the *z* statistic. Probability of *t* <= -2 is approximately 2.5%, likewise Probability that *t* >=2 is 2.5%.

**CHIDIST (*a, df*): or CHISQ.DIST (*a, df,* 1**)

Returns the probability that Chi‑Square with *df* degrees of freedom >= *a* (right-tail)

e.g., CHIDIST (12, 5) = .034788. This is the probability that chi-square value with 5 degrees of freedom exceeds 12.

*The new version returns the left-tail (1 =-right-tail cum prob****.)***

**CHIINV (*P, df*): or CHISQ.INV (*P, df*)**

Returns the value of Chi‑Square for which the right tail probability = *P*

e.g., CHIINV (0.10, 4) = 7.779434. This is the value of the chi‑square with 4 *df* so that the right tail probability is about 10%.

*The new version returns the chi-squared value for which the left tail probability is P*

**POISSON (*x, lambda, cum*): or POISSON.DIST (*x, lambda, cum*)**

Both return the probability of *x* (if cum=0) for a Poisson distribution with mean = *lambda*. Both return *P* (0) + *P* (1) + … *P*(*x*) (if cum=l) e.g., POISSON (5, 2.5, 0) = .066801. This the probability of an observation of exactly 5, for a Poisson with mean = 2.5; while POISSON(5,2 .5, 1) = .957979 is the cumulative probability at *x* = 5 i.e., P(0) + P(l) + P(2) +P(3) + P(4) + P(5)

**FDIST (*a, df\_num, df\_den*): or F.DIST (*a, df\_num, df\_den,* 1*)***

Returns the right tail probability (probability that F exceeds some number *a*)

*The new version returns the left- tail (*1*-right-tail) probability*

e.g., FDIST (5, 2, 7) = .044799 is the probability that the *F* statistic >= 5 for a distribution having numerator degrees of freedom of 2 and denominator degrees of freedom of 7.

**FINV (*P, df\_num, df\_den):* or F.INV (1 - *P, df\_num, df\_den*)**

Returns the *F* value for which the right tail probability is *P*.

e.g., FINV (0.05, 3, 5) = F.INV (.95, 3, 5) = 5.409447 is the *F* value for which the right tail probability is 5% (*i.,e*., the left-tail probablity is 95%).