Cheat Sheet - Numerical Functions and Operators

This sheet is intended to provide an overview of Fortran numerical operators and functions

- 01 Operators
  - A + B addition
  - A - B subtraction
    - -A unary negation
  - A * B multiplication
  - A / B division
  - A**B Exponentiation. Faster if B is an integer.
- 02 Scientific notation
  - 1.234E5 = 1.234 x 10^5
  - 1.234E5_mykind = 1.234 x 10^5 with a kind **mykind**
  - 1.234D5 = 1.234 x 10^5 as a double precision number. Obsolescent, use kind warts instead
- 03 Numerical functions
  - This is a non exhaustive list of the numerical functions in Fortran. Where functions can operate with different sets of parameters only the clearest common example is given
    - Functions marked * require Fortran 2008
  - ABS(X) - Absolute value of X. For complex X calculates the modulus and returns as a REAL number with the same kind as X
  - ACOS(X) /ASIN(X)/ATAN(X)- Inverse cosine/sine/tangent of X. Must be REAL or COMPLEX. If REAL X must be [-1.0,1.0]
  - ACOSH(X)/ASINH(X)/ATANH(X)* - Inverse hyperbolic cosine/sine/tangent of X. Must be REAL or COMPLEX

- AIMAG(X) - Returns imaginary part of complex number. Returns real with same kind as X
- ATAN2(X, Y) - computes the principal of the argument function for the complex number X + iY
- BESSEL_J0(X)* - computes the Bessel function of the first kind of order 0 of X
- BESSEL_J1(X)* - computes the Bessel function of the first kind of order 1 of X
- BESSEL_JN(N, X)* - computes the Bessel function of the first kind of order N of X. N must be a positive integer, some compilers support negative integers but this is not portable. Use BESSEL_J0 or BESSEL_J1 rather than BESSEL_JN if possible for performance reasons
- BESSEL_Y0(X)* - computes the Bessel function of the second kind of order 0 of X
- BESSEL_Y1(X)* - computes the Bessel function of the second kind of order 1 of X
- BESSEL_YN(N,X)* - computes the Bessel function of the second kind of order N of X. N must be a positive integer, some compilers support negative integers but this is not portable. Use BESSEL_Y0 or BESSEL_Y1 rather than BESSEL_YN if possible for performance reasons
- CEILING(X) - Returns the least integer greater than or equal to X
- CMPLX(X, Y) - Converts two REAL numbers of the same KIND to a complex number of the same kind
- CONJG(Z) - Returns the complex conjugate of a complex number
- COS(X)/SIN(X)/TAN(X) - Returns the cosine/sine/tangent of a REAL or COMPLEX number
- COSH(X)/SINH(X)/TANH(X) - Returns the hyperbolic cosine/sine/tangent of a REAL or COMPLEX number
- ERF(X) * - Returns the error function of X
- ERFC(X)* - Returns the complementary error function of X
- ERFC_SCALED(X)* - Returns the scaled complementary error function of X
- EXP(X) - Returns the base *e* exponential of X
- FLOOR(X) - Returns the greatest integer less than or equal to X

- GAMMA(X)* - Returns the gamma function for X
- LOG(X) - Returns logarithm base *e* of X
- LOG10(X) - Returns logarithm base 10 of X
- LOG_GAMMA(X)* - Returns natural logarithm of the absolute value of the gamma function (see GAMMA)
- MOD(X, Y) - Returns the remainder from the division of X by Y
- NINT(X) - Returns the nearest integer to REAL X
- NORM2(A)* - Returns the L2 norm of array A
- SQRT(X) - Returns square root of REAL or COMPLEX X. Will only return complex values if X is complex.
- SUM(A) - Returns the sum of the values of A