

# PHYS-4007/5007: Computational Physics

## FORTRAN Intrinsic Functions

### Common FORTRAN Supplied Mathematical Functions

| Function           | Definition                           | Number of Arguments | Name                        | Mode of Arguments $a$                     | Value of Function $f$                  |
|--------------------|--------------------------------------|---------------------|-----------------------------|-------------------------------------------|----------------------------------------|
| Absolute Value     | $f =  a $                            | 1                   | IABS<br>ABS<br>DABS<br>CABS | Integer<br>Real<br>Double Prec<br>Complex | Integer<br>Real<br>Double Prec<br>Real |
| Square Root        | $f = \sqrt{a},$<br>$a \geq 0$        | 1                   | SQRT<br>DSQRT<br>CSQRT      | Real<br>Double Prec<br>Complex            | Real<br>Double Prec<br>Complex         |
| Exponential        | $f = e^a$                            | 1                   | EXP<br>DEXP<br>CEXP         | Real<br>Double Prec<br>Complex            | Real<br>Double Prec<br>Complex         |
| Natural Logarithms | $f = \ln(a),$<br>$a > 0$             | 1                   | ALOG<br>DLOG<br>CLOG        | Real<br>Double Prec<br>Complex            | Real<br>Double Prec<br>Complex         |
| Common Logarithms  | $f = \log_{10}(a),$<br>$a > 0$       | 1                   | ALOG10<br>DLOG10            | Real<br>Double Prec                       | Real<br>Double Prec                    |
| Sine               | $f = \sin(a)$<br>$a$ in radians      | 1                   | SIN<br>DSIN<br>CSIN         | Real<br>Double Prec<br>Complex            | Real<br>Double Prec<br>Complex         |
| Cosine             | $f = \cos(a)$<br>$a$ in radians      | 1                   | COS<br>DCOS<br>CCOS         | Real<br>Double Prec<br>Complex            | Real<br>Double Prec<br>Complex         |
| Tangent            | $f = \tan(a)$<br>$a$ in radians      | 1                   | TAN<br>DTAN                 | Real<br>Double Prec                       | Real<br>Double Prec                    |
| Arcsine            | $f = \sin^{-1}(a)$<br>$f$ in radians | 1                   | ASIN<br>DASIN               | Real<br>Double Prec                       | Real<br>Double Prec                    |
| Arccosine          | $f = \cos^{-1}(a)$<br>$f$ in radians | 1                   | ACOS<br>DACOS               | Real<br>Double Prec                       | Real<br>Double Prec                    |
| Arctangent         | $f = \tan^{-1}(a)$<br>$f$ in radians | 1                   | ATAN<br>DATAN               | Real<br>Double Prec                       | Real<br>Double Prec                    |

Note that “Double Prec” is short for Double Precision.

### Common FORTRAN Supplied Miscellaneous Functions

| Function                           | Definition<br>( $a_1, a_2 \equiv$<br>arguments)                                            | Number of<br>Arguments | Name                                    | Mode of<br>Argument(s)                            | Value of<br>Function $f$                          |
|------------------------------------|--------------------------------------------------------------------------------------------|------------------------|-----------------------------------------|---------------------------------------------------|---------------------------------------------------|
| Mode<br>Conversion                 | Conversion<br>to Integer                                                                   | 1                      | INT or IFIX<br>IDINT                    | Real<br>Double Prec                               | Integer<br>Integer                                |
|                                    | Conversion<br>to Real                                                                      | 1                      | FLOAT<br>SNGL<br>REAL                   | Integer<br>Double Prec<br>Complex                 | Real<br>Real<br>Real                              |
|                                    | Imaginary Part of<br>a Complex Value                                                       | 1                      | AIMAG                                   | Complex                                           | Real                                              |
|                                    | Conversion to<br>Double Prec                                                               | 1                      | DFLOAT<br>DBLE                          | Integer<br>Real                                   | Double Prec<br>Double Prec                        |
| Transfer<br>of Sign                | $f = \text{xSIGN}(a_1, a_2)$<br>$f =  a_1 $ if $a_2 > 0$<br>$f = - a_1 $ if $a_2 < 0$      | 2                      | ISIGN<br>SIGN<br>DSIGN                  | Integer<br>Real<br>Double Prec                    | Integer<br>Real<br>Double Prec                    |
| Positive<br>Difference             | $f = \text{xDIM}(a_1, a_2)$<br>$f = a_1 - a_2$ if $a_1 > a_2$<br>$f = 0$ if $a_1 \leq a_2$ | 2                      | IDIM<br>DIM<br>DDIM                     | Integer<br>Real<br>Double Prec                    | Integer<br>Real<br>Double Prec                    |
| Select the<br>Largest<br>Value     | The Largest<br>of $(a_1, a_2, \dots)$                                                      | $\geq 2$               | MAX0<br>AMAX1<br>DMAX1<br>AMAX0<br>MAX1 | Integer<br>Real<br>Double Prec<br>Integer<br>Real | Integer<br>Real<br>Double Prec<br>Real<br>Integer |
| Select the<br>Smallest<br>Value    | The Smallest<br>of $(a_1, a_2, \dots)$                                                     | $\geq 2$               | MIN0<br>AMIN1<br>DMIN1<br>AMIN0<br>MIN1 | Integer<br>Real<br>Double Prec<br>Integer<br>Real | Integer<br>Real<br>Double Prec<br>Real<br>Integer |
| Remainder<br>(Modulus)<br>Function | $f = \text{xMOD}(a_1, a_2)$<br>$f = a_1 -$<br>$\text{INT}(a_1/a_2)*a_2$                    | 2                      | MOD<br>AMOD<br>DMOD                     | Integer<br>Real<br>Double Prec                    | Integer<br>Real<br>Double Prec                    |
| Number of<br>Characters            | Length of a<br>Character String                                                            | 1                      | LEN                                     | Character                                         | Integer                                           |
| Position of<br>a Substring         | Index of a<br>Substring                                                                    | 2                      | INDEX                                   | Character                                         | Integer                                           |

Note that “Double Prec” is short for Double Precision.