Helpful Functions

MATLAB provides many hundreds of built-in functions. Here, we provide tables of some of them that might be helpful to you in working problems for this course and later for applying what you learn in this course[1]:

Table 1. Matrix-building functions

FUNCTION	RETURNS AN N-BY-M MATRIX OF
`zeros(N,M)`	zeros
`ones(N,M)`	ones
`eye(N,M)`	zeros except for the diagonal elements that are ones
`rand(N,M)`	random numbers uniformly distributed in the range from 0 to 1

Table 2. Trigonometric functions

FUNCTION	RETURN
`acos(x)`	Angle in radians whose cosine equals x
`acot(x)`	Angle in radians whose cotangent equals x
`asin(x)`	Angle in radians whose sine equals x
`atan(x)`	Angle in radians whose tangent equals x
`atan2(y,x)`	Four-quadrant angle in radians whose tangent equals y/x
`cos(x)`	Cosine of x (x in radians)
`cot(x)`	Cotangent of x (x in radians)
`sin(x)`	Sine of x (x in radians)
`tan(x)`	Tangent of x (x in radians)

Table 3. Exponential functions

FUNCTION	RETURNS
`exp(x)`	*e* raised to the x power
`log(x)`	Natural logarithm x
`log2(x)`	Base-2 logarithm of x
`log10(x)`	Base-10 logarithm of x
`sqrt(x)`	Square root of x

Table 4. Functions that work on complex numbers

FUNCTION	RETURNS
`abs(z)`	Absolute value of z
`angle(z)`	Phase angle of z
`conj(z)`	Complex conjugate of z
`imag(z)`	Imaginary part of z
`real(z)`	Real part of z

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[1] Tables excerpted from *Computer Programming with MATLAB*, revised edition, by J. Michael Fitzpatrick and Ákos Lédeczi, 2013.

Table 5. Rounding and remainder functions

FUNCTION	RETURNS
`fix(x)`	Round x towards zero
`floor(x)`	Round x towards minus infinity
`ceil(x)`	Round x towards plus infinity
`round(x)`	Round x towards nearest integer
`rem(x,n)`	Remainder of **x/n** (see help for case of noninteger n)
`sign(x)`	**1** if **x>0**; **0** if **x** equals **0**; **-1** if **x<0**

Table 6. Descriptive functions applied to a vector

FUNCTION	RETURNS
`length(v)`	Number of elements of v
`max(v)`	Largest element of v
`min(v)`	Smallest element of v
`mean(v)`	Mean of v
`median(v)`	Median element of v
`sort(v)`	Sorted version of v in ascending order
`std(v)`	Standard deviation of v
`sum(v)`	Sum of the elements of v

Table 7. Descriptive functions applied to a two-dimensional matrix

FUNCTION	RETURNS A ROW VECTOR CONSISTING OF
`max(M)`	Largest element of each column
`min(M)`	Smallest element of each column
`mean(M)`	Mean of each column
`median(M)`	Median of each column
`size(M)`	Number of rows, number of columns
`sort(M)`	Sorted version, in ascending order, of each column
`std(M)`	Standard deviation of each column
`sum(M)`	Sum of the elements of each column