MATLAB Cheat Sheet

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note: MATLAB® code is sensitive to casing, and insensitive to blank spaces except when defining arrays.

```
clc                          # Clear screen
clear x                      # Clear x variable
clear                        # Clear all variables

help elfun                   # Show elementary functions
sin(), cos(), tan(), cot()
exp(), abs()
factorial()

A = [1 2 3 4 5]              # Create a row matrix
B = [10; 20; 30]             # Create a column matrix
X = [1 5 8 0 0; 9 6 2 0 7; 2 4 5 0 1]
N = [9 3 5; 7 2 4; 1 4 2]
A(end)                       # Shows last element of matrix (array)
A(:)                         # Shows all elements in a column
A(9) = 1                     # Change 9th element in A(:)

N = 2:7                      # Range with specified distance
K = 10:7:70

A(1:2:end)                   # Shows odd elements
A(2:2:end)                   # Shows even elements

a = 5, b = 7
a * b                        # Matrix multiply ( for array multiply use .* )
a / b, a \ b                 # Matrix divide ( for array divide use ./ or .\ )
a + b, a - b
a ^ b
```

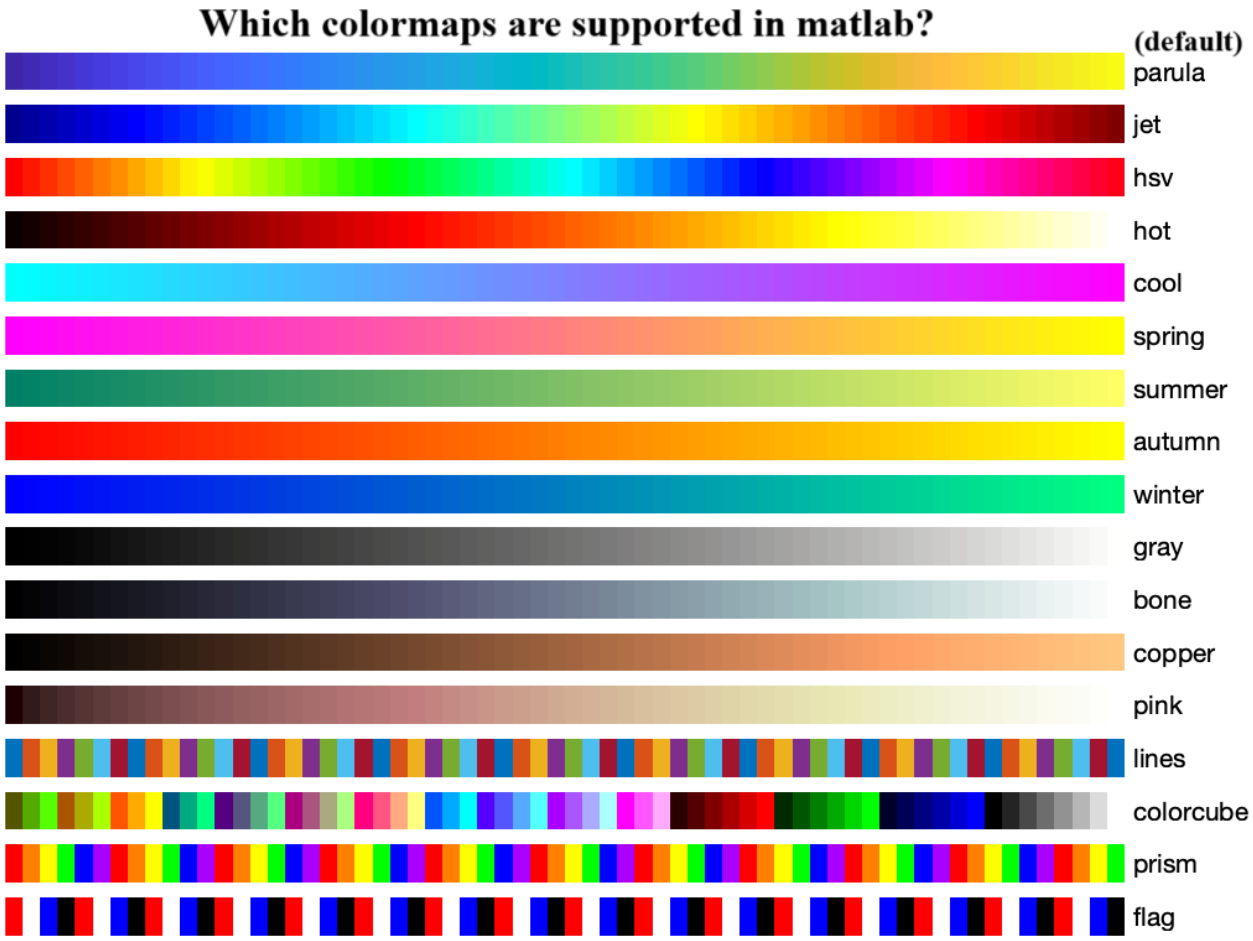
```
sum(1:10)
prod(1:10)

M = [1 2 3; 4 5 6; 7 8 9]
M(2,:)                  # Get second column
M(:,2)                  # Get second row
M(2,3)                  # Get element in 2th row and in 3th column
M(1,:) = []             # Delete first column
M(:,3) = []             # Delete third row
M(:,[2,5]) = []         # Delete a few rows

A = [1 2 3]
B = [4 5 6]
C = [A B]               # Row concatenation of two matrices
D = [A; B]              # Column concatenation of two matrices

length(X)               # Length of vector (it is equivalent to MAX(SIZE(X)) )
height(X)               # Number of rows in an array (is equivalent to SIZE(X, 1) )
size(X)                 # Size of array
ndims(X)                # Number of dimensions

nnz(X)                  # Number of non zeros elements
numel(X)                # Number of elements
sum(sum(X))             # Sum of all elements

X'                      # Transform a matrix
sort(X)
sort(X,1), sort(X,2)    # Sort for columns or rows
sort(X, 'descend'), sort(X, 'ascend')
sortrows(A,2)           # Sort second row of a matrix

min(X), max(X)
mean(X)                 # Shows Mean of each column as one row
max(max(X))             # Max of elements

tril(X)                 # Lower triangular matrix
triu(X)                 # Upper triangular matrix
diag(X)                 # Main diameter
sum(diag(X))            # Sum of the main diameter reservoirs

fliplr(X)               # Flip array in left/right direction
flipud(X)               # Flip array in up/down direction
```

```
rot90(X)                    # Rotate array 90 degrees
rot90(X,K)                  # Rotate array K*90 degrees

ones(m,n)
zeros(m,n)
eye(m,n)
det(B)                      # Determinant of a square matrix
inv(B)                      # Inverse of a square matrix
X = inv(A) * B              # AX = B  -->  X = A^-1 * B

magic(n)
pascal(n)
eig(N)                      # Eigenvalues and eigenvectors

<, >, <=, >=            # Less than, Greater than, Less than or equal, Greater than or equal
==, ~=                      # Equal, Not equal
&, |                        # Logical or, Logical and

r = X>0
X(r)                        # Shows elements greater than 0 in X

r = X>5 & X<20
X(r)

rem(-13,2)                  # Remainder after division
mod(-13,2)                  # Modulus after division

r = rem(X,2) ~= 0           # Find elements by condition
r = rem(X,2) == 0 & X >5
r = rem(X,2) ~= 0 | X>8
X(r) = X(r) + 100           # Change the specified elements

find(X>0)                   # Index of the elements that apply to the condition
all(X>0)                    # columns whose all elements are valid in the condition
any(X>0)                    # columns where at least one element applies to the condition

rand(m,n)                   # Uniformly distributed pseudorandom numbers
randn(m,n)                  # Normally distributed pseudorandom numbers
r = a + (b-a) .* rand();    # Random number in range (a,b)
randi(100, 1, 5)            # Random integer in 1:100

linspace(1,5,100)           # Linearly spaced vector
```

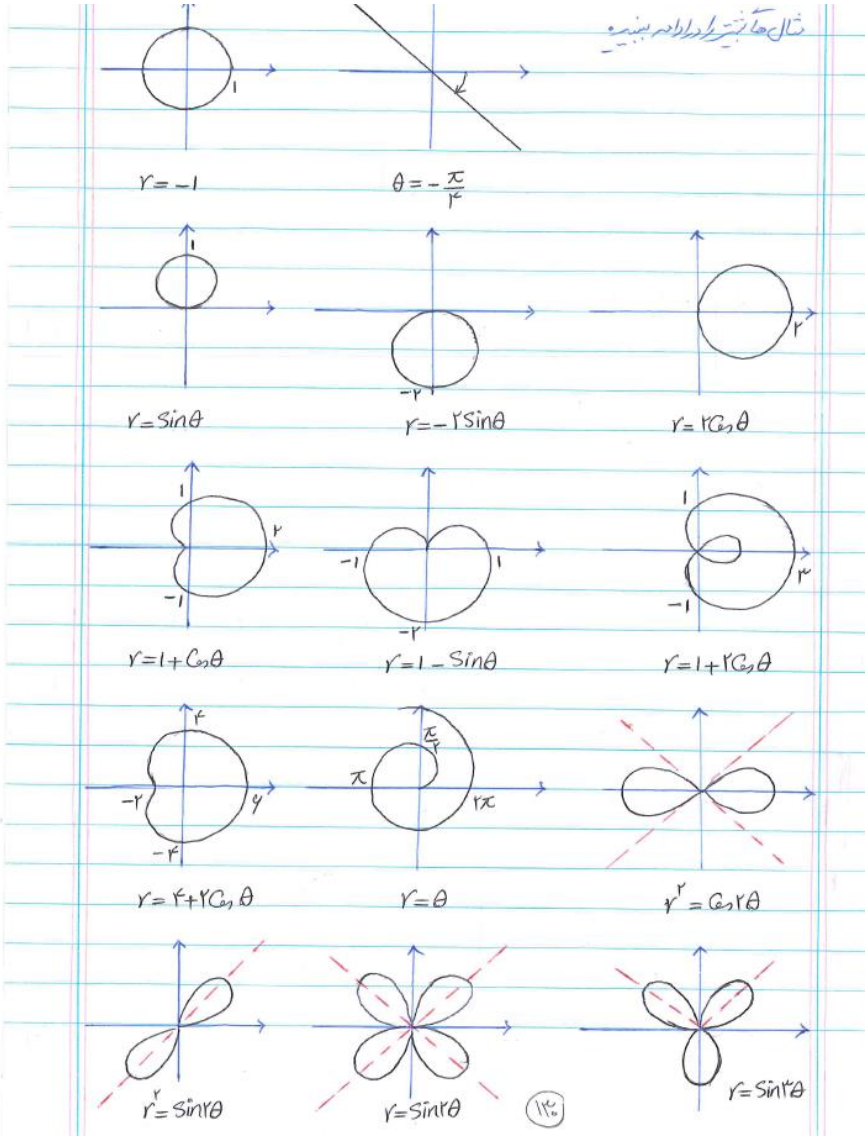
```
M = 0:0.25:1                    # Both included
repmat(X, 2, 5)                 # Replicate and tile an array
reshape(1:20,4,5)               # Reshape array by rearranging existing elements
T = 0 : .01 : 2*pi
plot(T, Sin(T))
plot(x, y, 'color style marker')

grid on                         # Grid lines
grid off
axis on                         # Control axis scaling and appearance
axis off
axis([XMIN XMAX YMIN YMAX])

figure                          # Create figure window
hold on                         # Hold current graph for next plot
hold off
subplot(m, n, k)          # Create axes in tiled positions (m rows, n columns, k=current window)
clf                             # Clears Figure
close                           # close all figures

xlabel("text")
ylabel("text")
zlabel("text")
title("text")
text(x, y, "text")              # Add text descriptions to data points
gtext("text")                   # Place text with mouse
legend('Label 1', 'Label 2')    # Create legend

gtext('\int_0^5 x.^2 dx')       # Mathematical symbols
\sum_{n=0}^{\infty}
\infty
\x^{y+1}
\sin
```

Character Sequence	Symbol	Character Sequence	Symbol	Character Sequence	Symbol
\alpha	α	\upsilon	υ	\sim	~
\angle	∠	\phi	ϕ	\leq	≤
\ast	*	\chi	χ	\infty	∞
\beta	β	\psi	ψ	\clubsuit	♣
\gamma	γ	\omega	ω	\diamondsuit	♦
\delta	δ	\Gamma	Γ	\heartsuit	♥
\epsilon	ϵ	\Delta	Δ	\spadesuit	♠
\zeta	ζ	\Theta	Θ	\leftrightarrow	↔
\eta	η	\Lambda	Λ	\leftarrow	←
\theta	θ	\Xi	Ξ	\Leftarrow	⇐
\vartheta	ϑ	\Pi	Π	\uparrow	↑
\iota	ι	\Sigma	Σ	\rightarrow	→
\kappa	κ	\Upsilon	Υ	\Rightarrow	⇒
\lambda	λ	\Phi	Φ	\downarrow	↓
\mu	μ	\Psi	Ψ	\circ	°
\nu	ν	\Omega	Ω	\pm	±
\xi	ξ	\forall	∀	\geq	≥
\pi	π	\exists	∃	\propto	∝
\rho	ρ	\ni	∋	\partial	∂
\sigma	σ	\cong	≅	\bullet	•
\varsigma	ς	\approx	≈	\div	÷
\tau	τ	\Re	ℜ	\neq	≠
\equiv	≡	\oplus	⊕	\aleph	ℵ
\Im	ℑ	\cup	∪	\wp	℘
\otimes	⊗	\subseteq	⊆	\oslash	⊘
\cap	∩	\in	∈	\supseteq	⊇
\supset	⊃	\lceil	⌈	\subset	⊂
\int	∫	\cdot	·	\o	o
\rfloor	⌋	\neg	¬	\nabla	∇
\lfloor	⌊	\times	x	\ldots	...
\perp	⊥	\surd	√	\prime	′
\wedge	∧	\varpi	ϖ	\0	∅
\rceil	⌉	\rangle	⟩	\mid	∣
\vee	∨	\langle	⟨	\copyright	©

```
Line(x, y, z)                    # Create line
rectangle('position',[1 2 5 6], 'curvature',1)  # Create rectangle, rounded-rectangle, or ellipse
triplot(TRI, x, y)               # Plots a 2D triangulation

r = rectangle('position', [0 0 1 1])      # Create and customize a rectangle
r.FaceColor = [0 .5 .5];
r.EdgeColor = 'b';
r.LineWidth = 3;

x = [1 2 3]; y = [2 3 2]; TRI = [1 2 3];
triplot(TRI, x, y)
axis([0 5 0 5])

plot3(x, y, z, 'color style marker')
box on                           # Adds a box to the current axes
box off                          # Removes the box from the current axes

comet3(x, y, z)                  # 3-D comet-like trajectories

[X, Y] = meshgrid(x, y)          # Cartesian rectangular grid in 2-D or 3-D
surf(X, Y, Z)                    # 3-D colored surface
mesh(X, Y, Z)                    # 3-D mesh surface
colormap(hot)                    # Sets the Colormap property of a figure
```




```
colormap('default')
colormap([1 1 1])          # RGB (between 0 and 1)

shading flat               # Sets the shading of the current graph to flat
shading interp             # Sets the shading to interpolated
shading faceted            # Sets the shading to faceted, which is the default

sphere(N)                  # Graph the sphere as a SURFACE and do not return anything
[X,Y,Z] = sphere(N)        # Generates three (N+1)by(N+1) matrices
surf(X,Y,Z)                # Produces a unit sphere

axis equal                 # equal tick mark increments on the x-,y- and z-axis are equal in size
axis square                # makes the current axis box square in size

cylinder(R,N)              # forms the unit cylinder based on the generator curve in the vector R. The cylinder has N points around the circumference.
[X,Y,Z] = cylinder(R)      # Default to N = 20, you can graph it with MESH or SURF

polar(THETA, RHO)          # makes a plot using polar coordinates of the angle THETA, in radians, versus the radius RHO.
```



t = 0 : .01 : 2*pi ; r = 5

```
x = R * cos(t)
y = R * sin(t)
plot(x, y)                          # Draws a circle with radius R

polar(t, R + zeros(size(t)))        # Draws a circle with radius R

pos = [0 0 R R];
rectangle('position', pos, 'curvature', [1 1])  # Draws a circle with radius R
axis equal

ezplot('sin(x)')                    # (NOT RECOMMENDED) Easy to use function plotter
ezplot3('sin(x)', 'cos(x)', 'x', [0, 2.* pi], 'animate')
# (NOT RECOMMENDED) Easy to use 3-d parametric curve plotter

ezmesh('tan(x)')                    # (NOT RECOMMENDED) Easy to use 3-D mesh plotter
ezsurf('tanh(x)')                   # (NOT RECOMMENDED) Easy to use 3-D colored surface plotter
ezpolar('1+cos(t)')                 # Easy to use polar coordinate plotter
```

```
fill(x, y, color)                  # Filled 2-D polygons

x = 0 : .01 : 2*pi;
y = sin(x)
t = x(end : -1 : 1)                # The same as t = fliplr(x)
u = cos(t)
a = [x t]; b = [y u]
fill(a, b, 'g' )                   # Coloring the area between sine and cosine

p=[3 0 -5]                         # p(x)=3x^2-5
x=roots(p)                         # Find polynomial roots
poly(x)                            # Convert roots to polynomial

conv(A, B)                         # Convolution and polynomial multiplication
[X, R] = deconv(Y, H)              # Least-squares deconvolution and polynomial division

Y = polyval(P, X)                  # Evaluate polynomial
polyder(P)                         # Differentiate polynomial
polyint(P)                         # Integrate polynomial analytically

F = polyfit(X, Y, N)               # Fit polynomial to data
hold on
plot(X, polyval(F, X), 'b')
```