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% An edited MATLAB reference card
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>> help
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HELP topics:
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```
matlab/general - General purpose commands.
matlab/ops      - Operators and special characters.
matlab/lang     - Programming language constructs.
matlab/elfun    - Elementary math functions.
matlab/specfun  - Specialized math functions.
matlab/matfun   - Matrix functions - numerical linear algebra.
matlab/datafun  - Data analysis and Fourier transforms.
matlab/polyfun  - Interpolation and polynomials.
matlab/funfun   - Function functions and ODE solvers.
matlab/sparfun  - Sparse matrices.
matlab/graph2d  - Two dimensional graphs.
matlab/graph3d  - Three dimensional graphs.
matlab/specgraph - Specialized graphs.
matlab/graphics - Handle Graphics.
matlab/uitools  - Graphical user interface tools.
matlab/strfun   - Character strings.
matlab/iofun    - File input/output.
matlab/timefun  - Time and dates.
matlab/datatypes - Data types and structures.
matlab/demos    - Examples and demonstrations.
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For more help on directory/topic, type "help topic".
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```
>> help elmat
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```
Elementary matrices and matrix manipulation.
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```
Elementary matrices.
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```
zeros - Zeros array.
ones  - Ones array.
eye   - Identity matrix.
repmat - Replicate and tile array.
rand  - Uniformly distributed random numbers.
randn - Normally distributed random numbers.
linspace - Linearly spaced vector.
logspace - Logarithmically spaced vector.
meshgrid - X and Y arrays for 3-D plots.
:       - Regularly spaced vector and index into matrix.
```

```
Basic array information.
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```
size - Size of matrix.
length - Length of vector.
disp - Display matrix or text.
isempty - True for empty matrix.
isequal - True if arrays are identical.
isnumeric - True for numeric arrays.
islogical - True for logical array.
logical - Convert numeric values to logical.
```

```
Matrix manipulation.
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```
reshape - Change size.
diag - Diagonal matrices and diagonals of matrix.
tril - Extract lower triangular part.
triu - Extract upper triangular part.
fliplr - Flip matrix in left/right direction.
flipud - Flip matrix in up/down direction.
find - Find indices of nonzero elements.
end - Last index.
sub2ind - Linear index from multiple subscripts.
ind2sub - Multiple subscripts from linear index.
```

```
Special variables and constants.
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ans - Most recent answer.
eps - Floating point relative accuracy.
realmax - Largest positive floating point number.
```

```
realmin - Smallest positive floating point number.
pi - 3.1415926535897....
i, j - Imaginary unit.
inf - Infinity.
NaN - Not-a-Number.
isnan - True for Not-a-Number.
isinf - True for infinite elements.
isfinite - True for finite elements.
flops - Floating point operation count.
```

```
>> help elfun
```

```
Elementary math functions.
```

```
Trigonometric.
```

```
sin - Sine.
sinh - Hyperbolic sine.
asin - Inverse sine.
asinh - Inverse hyperbolic sine.
cos - Cosine.
cosh - Hyperbolic cosine.
acos - Inverse cosine.
acosh - Inverse hyperbolic cosine.
tan - Tangent.
tanh - Hyperbolic tangent.
atan - Inverse tangent.
atan2 - Four quadrant inverse tangent.
atanh - Inverse hyperbolic tangent.
sec - Secant.
sech - Hyperbolic secant.
csc - Cosecant.
csch - Hyperbolic cosecant.
cot - Cotangent.
coth - Hyperbolic cotangent.
```

```
Exponential.
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exp - Exponential.
log - Natural logarithm.
log10 - Common (base 10) logarithm.
sqrt - Square root.
```

```
Complex.
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abs - Absolute value.
angle - Phase angle.
conj - Complex conjugate.
imag - Complex imaginary part.
real - Complex real part.
isreal - True for real array.
```

```
Rounding and remainder.
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```
fix - Round towards zero.
floor - Round towards minus infinity.
ceil - Round towards plus infinity.
round - Round towards nearest integer.
mod - Modulus (signed remainder after division).
rem - Remainder after division.
sign - Signum.
```

```
>> help lang
```

```
Programming language constructs.
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```
Control flow.
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```
if - Conditionally execute statements.
else - IF statement condition.
elseif - IF statement condition.
end - Terminate scope of FOR, WHILE, SWITCH and IF.
for - Repeat statements a specific number of times.
while - Repeat statements an indefinite number of times.
break - Terminate execution of WHILE or FOR loop.
switch - Switch among several cases based on expression.
```

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case      - SWITCH statement case.
otherwise - Default SWITCH statement case.
return    - Return to invoking function.

Evaluation and execution.
eval      - Execute string with MATLAB expression.
feval     - Execute function specified by string.
run       - Run script.

Scripts, functions, and variables.
script    - About MATLAB scripts and M-files.
function  - Add new function.
global    - Define global variable.
mfilename - Name of currently executing M-file.
exist     - Check if variables or functions are defined.
isglobal  - True for global variables.

Argument handling.
nargchk   - Validate number of input arguments.
nargin    - Number of function input arguments.
nargout   - Number of function output arguments.

Message display.
error     - Display error message and abort function.
warning   - Display warning message.
errortrap - Skip error during testing.
disp      - Display an array.
fprintf   - Display formatted message.
sprintf   - Write formatted data to a string.

Interactive input.
input     - Prompt for user input.
keyboard  - Invoke keyboard from M-file.
pause     - Wait for user response.

```

>> help ops

Operators and special characters.

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Arithmetic operators.
plus      - Plus          +
minus     - Minus        -
mtimes    - Matrix multiply *
times     - Array multiply .*
mpower    - Matrix power  ^
power     - Array power  .^
mldivide  - Backslash or left matrix divide \
mrdivide  - Slash or right matrix divide /
ldivide   - Left array divide .\
rdivide   - Right array divide ./
kron      - Kronecker tensor product kron

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Relational operators.
eq        - Equal          ==
ne        - Not equal      ~=
lt        - Less than      <
gt        - Greater than   >
le        - Less than or equal <=
ge        - Greater than or equal >=

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Logical operators.
and       - Logical AND    &
or        - Logical OR     |
not       - Logical NOT    ~
xor       - Logical EXCLUSIVE OR
any       - True if any element of vector is nonzero
all       - True if all elements of vector are nonzero

```

```

Special characters.
colon     - Colon          :
paren     - Parentheses and subscripting ( )
paren     - Brackets      [ ]

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punct     - Continuation    ...
punct     - Semicolon      ;
punct     - Comment        %
punct     - Assignment     =
punct     - Quote          '
transpose - Transpose       .'
ctranspose - Complex conjugate transpose

```

>> help matfun

Matrix functions - numerical linear algebra.

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Matrix analysis.
norm      - Matrix or vector norm.
rank      - Matrix rank.
det       - Determinant.
null      - Null space.

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Linear equations.
\ and /   - Linear equation solution; use "help slash".
inv       - Matrix inverse.
cond      - Condition number with respect to inversion.
chol      - Cholesky factorization.
lu        - LU factorization.

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Eigenvalues and singular values.
eig       - Eigenvalues and eigenvectors.
svd       - Singular value decomposition.
poly      - Characteristic polynomial.
condeig   - Condition number with respect to eigenvalues.

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Matrix functions.
expm      - Matrix exponential.
logm      - Matrix logarithm.
sqrtm     - Matrix square root.
funm      - Evaluate general matrix function.

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>> help debug

Debugging commands.

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dbstop    - Set breakpoint.
dbclear   - Remove breakpoint.
dbcont    - Resume execution.
dbdown    - Change local workspace context.
dbstack   - List who called whom.
dbstatus  - List all breakpoints.
dbstep    - Execute one or more lines.
dbtype    - List M-file with line numbers.
dbup      - Change local workspace context.
dbquit    - Quit debug mode.

```