CHE/CEN138

COMPUTER PROGRAMMING

BUILT-IN FUNCTIONS, POLYNOMIALS, CURVE FITTING

References

1.Pratap, R. “Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers”Oxford University Press, 2010.
2.Hunt, B.R., Lipsman, L.R. and Rosemberg J. M. “A guide to MATLAB for Beginners and ExperiencedUsers"Cambridge University Press, 2001.
3.Kubat, C. “MATLAB Yapay Zeka ve Mühendislik Uygulamaları” İkinci Baskı, Pusula Yayıncılık, 2014McGraw Hill, International Edition 2012.

BUILT-IN FUNCTIONS

- exp : This MATLAB function returns the exponential ex for each element in array X.
- log : This MATLAB function returns the natural logarithm ln(x) of each element in array X.
- log10 : This MATLAB function returns the common logarithm of each element in array X.
- sqrt : This MATLAB function returns the square root of each element of the array X.
- tan : This MATLAB function returns the tangent of each element of X.
- abs : This MATLAB function returns the absolute value of each element in array X.

BUILT-IN FUNCTIONS

- mean : This MATLAB function returns the **mean** of the elements of A along the first array dimension whose size does not equal 1
- std : This MATLAB function returns the standard deviation of the elements of A along the first array dimension whose size does not equal 1.
- rand : This MATLAB function returns a single uniformly distributed random number in the interval (0,1).
- round : This MATLAB function rounds each element of X to the nearest integer.
- conv : This MATLAB function returns the convolution of vectors u and v.

BUILT-IN FUNCTIONS

- polyfit : This MATLAB function returns the coefficients for a polynomial p(x) of degree n that is a best fit (in a least-squares sense) for the data in y.
- polyval : This MATLAB function evaluates the polynomial p at each point in x.
- roots : This MATLAB function returns the **roots** of the polynomial represented by p as a column vector
- fzero : This MATLAB function tries to find a point x where fun(x) = 0.

BUILT-IN FUNCTIONS

- diff : This MATLAB function differentiates F with respect to the variable determined by symvar(F,1).
- ode23 : This MATLAB function, where tspan = [t0 tf], integrates the system of differential equations from t0 to tf with initial conditions y0.
- int : This MATLAB function computes the indefinite integral of expr with respect to the symbolic scalar variable var.
- solve : This MATLAB function solves the equation eqn for the variable var.

BUILT-IN FUNCTIONS

- laplace : This MATLAB function returns the **Laplace** Transform of f
- sum : This MATLAB function returns the **sum** of the elements of A along the first array dimension whose size does not equal 1
- feval : This MATLAB function evaluates a function using its name or its handle, and using the input arguments x1,...,xM.
- fopen : This MATLAB function opens the file, filename, for binary read access, and returns an integer file identifier equal to or greater than 3.

POLYNOMIALS&CURVE FITTING

Following script fits a straight line (first order polynomial y = mx+n) to the x-y data given below and plots the given data as points(o) and fitted data as a line.

```
x=[1 2 3 4 5]          %Xdata
y=[3 5 7 9 11]         %Ydata
a=polyfit(x,y,1)       % fits a line and gives the values of m and n
yfit=polyval(a,x)      % evaluates the polynomial at Xdata
plot(x,y,'o', x,yfit)  %plot exact data and fitted line
```

It is obvious from the data that y=2x+1 and there was a perfect fit to the data.
Run the script given above and reproduce the results.

EXERCISES

- Fit a straight line to the data set given below and plot exact data and fitted line by MATLAB. For F=md+n, find the values of m and d.

d	15.5	33.07	53.39	140.24	301.03
F	0.0491	0.0981	0.1962	0.4905	0.9810

- Fit a second order polynomial to the data set given below. For y=ax2+bx+c, find the values of a, b and c by MATLAB.

x	1	2	3	4	5
y	1	4	9	16	25