

# CHE/CEN I 38

# COMPUTER PROGRAMMING

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SYMBOLIC MATH OPERATIONS, DIFFERENTIATION, INTEGRATION, SIMULINK

# References

1. Prata, 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 Experienced Users" Cambridge University Press, 2001.
3. Kubat, C. "MATLAB Yapay Zeka ve Mühendislik Uygulamaları" İkinci Baskı, Pusula Yayıncılık, 2014 McGraw Hill, International Edition 2012.

# SYMBOLIC MATH TOOLBOX

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Symbolic Math Toolbox™ provides functions for solving, plotting, and manipulating symbolic math equations. The toolbox provides functions in common mathematical areas such as calculus, linear algebra, algebraic and ordinary differential equations, equation simplification, and equation manipulation.

Symbolic Math Toolbox lets you analytically perform differentiation, integration, simplification, transforms, and equation solving.

# SYMBOLIC MATH OPERATIONS

---

```
syms x y
```

```
f=(x+y)^3
```

```
a=expand(f)
```

```
b=factor(a)
```

```
f =
```

```
(x + y)^3
```

```
a =
```

```
x^3 + 3*x^2*y + 3*x*y^2 + y^3
```

```
b =
```

```
[ x + y, x + y, x + y]
```

# SYMBOLIC MATH OPERATIONS

## Differentiation

---

```
syms x y
f=(x+y)^3
a=expand(f)
b=diff(a)
c=diff(diff(a))
d=diff(a,2)
```

```
f =
(x + y)^3
a =
x^3 + 3*x^2*y + 3*x*y^2 + y^3
b =
3*x^2 + 6*x*y + 3*y^2
c =
6*x + 6*y
d =
6*x + 6*y
```

# SYMBOLIC MATH OPERATIONS

## Integration

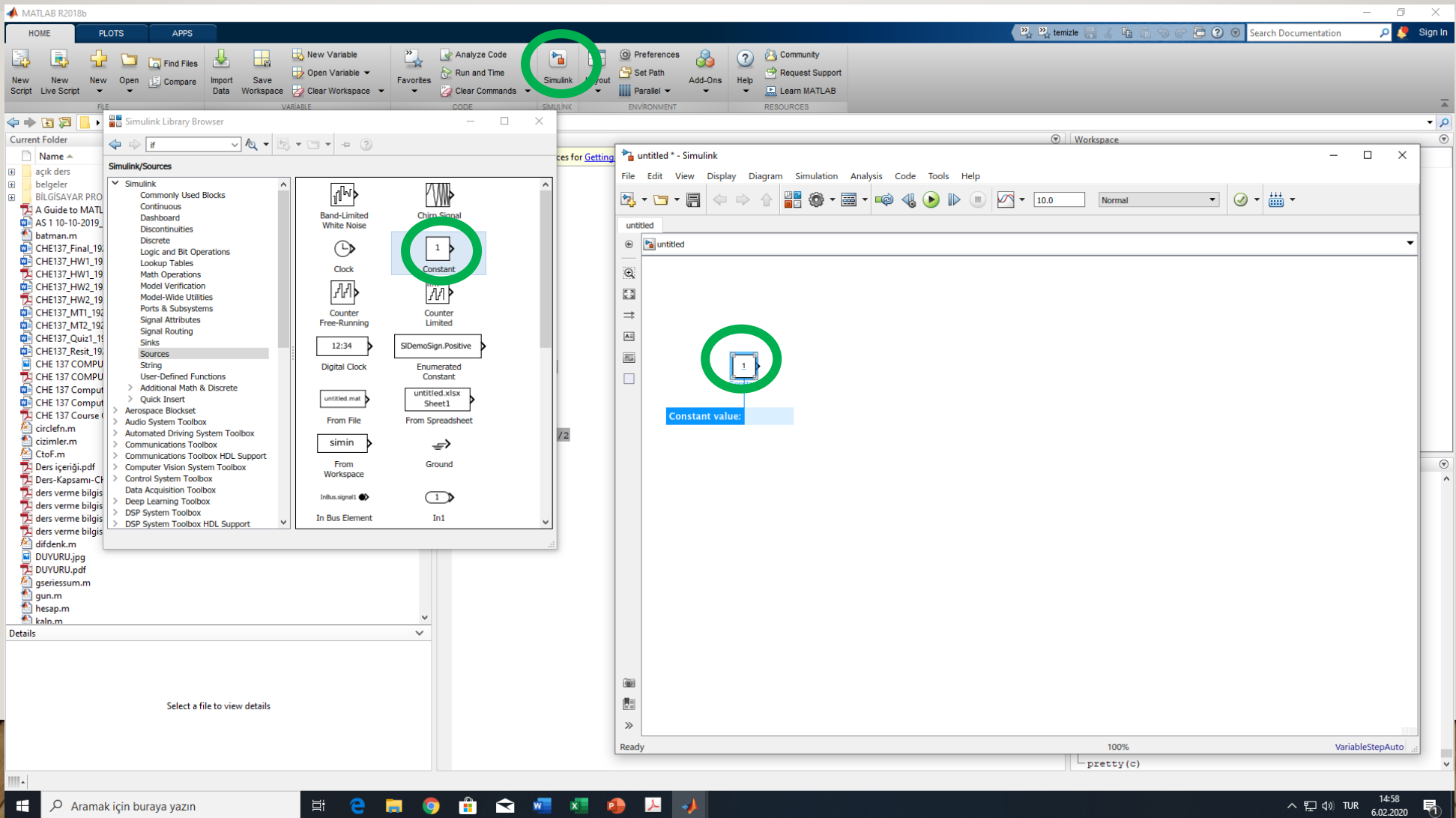
```
syms x y
f=x^2*y+y
c=int(f,y)
c=expand(c)
pretty(c)
```

```
f =
y*x^2 + y
c =
y^2*(x^2/2 + 1/2)
c =
(x^2*y^2)/2 + y^2/2
```

```
  2 2 2
x y y
----- + --
  2  2
```

# SIMULINK

- Simulink® is a block diagram environment for multidomain simulation and Model-Based Design.





# SIMULINK

