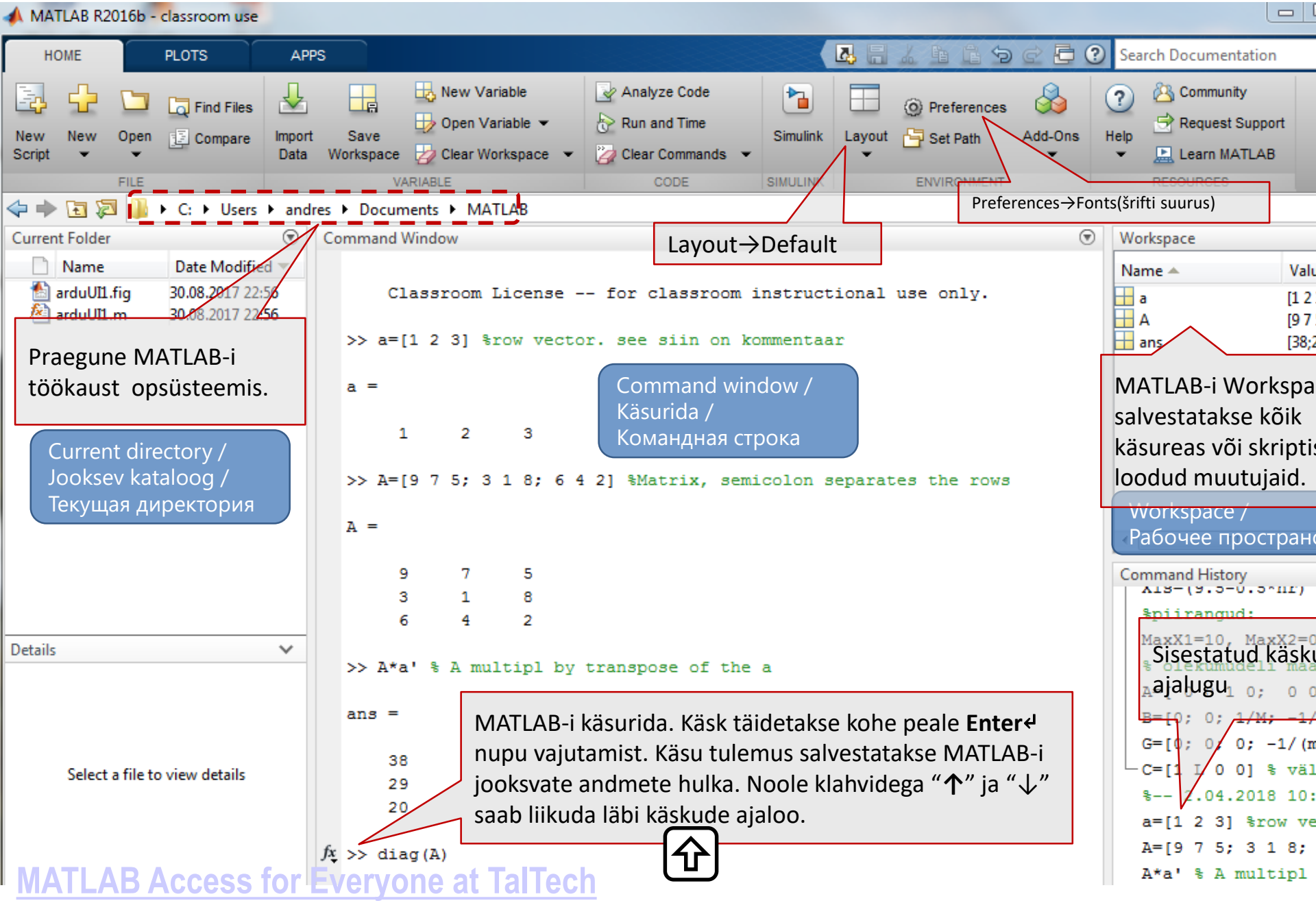
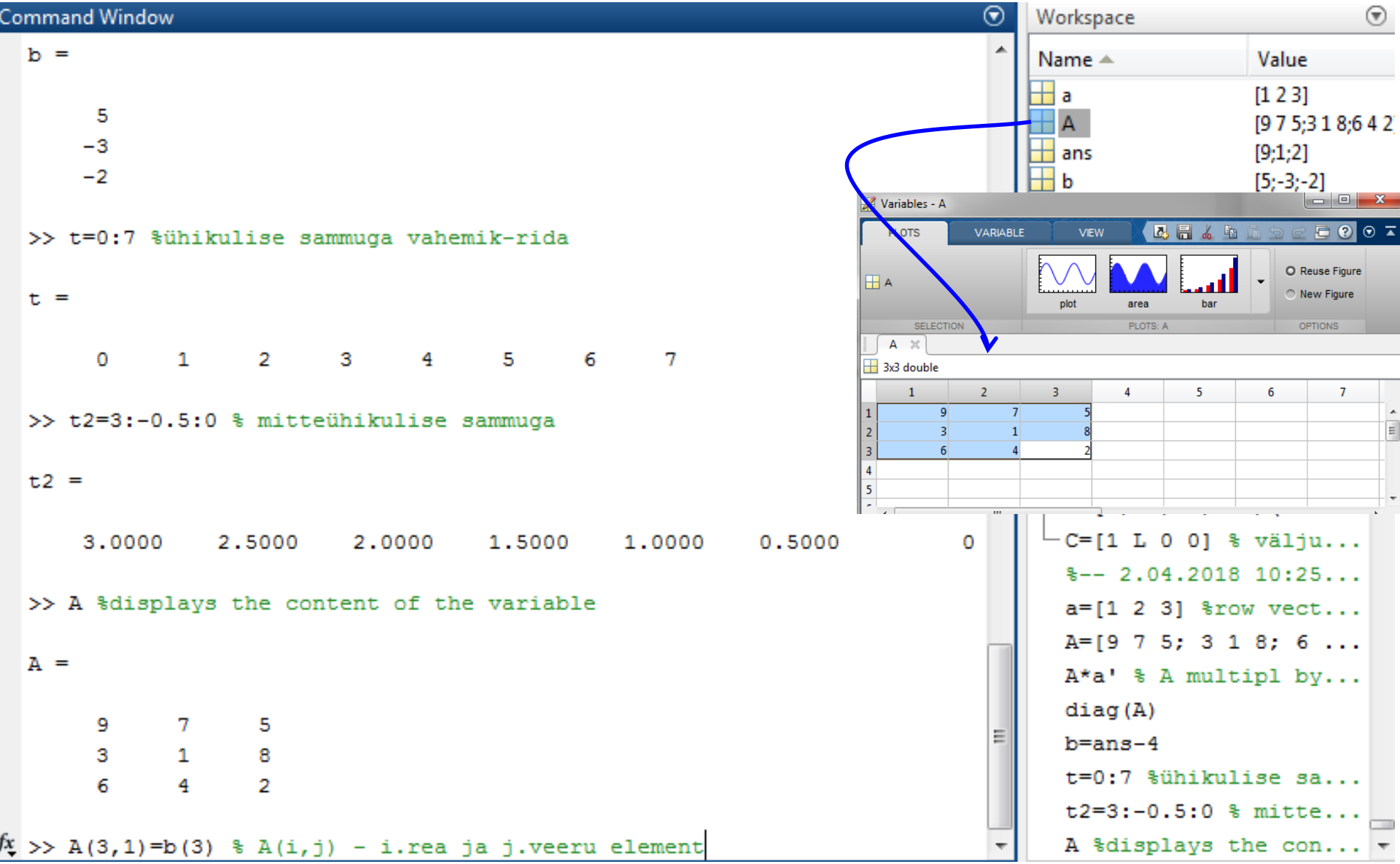
MATLAB: kasutajaliides, muutujate sisestus- jm käsud




Command Window
b =
5
-3
-2
>> t=0:7 %ühikulise sammuga vahemik-rida
t =
0 1 2 3 4 5 6 7
>> t2=3:-0.5:0 % mitteühikulise sammuga
t2 =
3.0000 2.5000 2.0000 1.5000 1.0000 0.5000 0
>> A %displays the content of the variable
A =
9 7 5
3 1 8
6 4 2
>> A(3,1)=b(3) % A(i,j) - i.rea ja j.veeru element
Workspace
Name
Value
a
[1 2 3]
A
[9 7 5;3 1 8;6 4 2
ans
[9;1;2]
b
[5;-3;-2]
Variables - A
PLOTS
VARIABLE
VIEW
plot
area
bar
Reuse Figure
New Figure
SELECTION
PLOTS: A
OPTIONS
A
3x3 double
C=[1 L 0 0] % välju...
%-- 2.04.2018 10:25...
a=[1 2 3] %row vect...
A=[9 7 5; 3 1 8; 6 ...
A*a' % A multipl by...
diag(A)
b=ans-4
t=0:7 %ühikulise sa...
t2=3:-0.5:0 % mitte...
A %displays the con...

```
>> 12^2          % "^" on astendamine
```

```
>> sqrt(-1)  % i tähistab imaginaarosa
ans =
        0 + 1.0000i
```

```
>> log(0)
ans =
  -Inf
>> % s.o. lõpmatus – infinity
```

```
>> var1=1.602e-4
var1 =
  1.6020e-004
>> % 1,6020 korda kümme miinus
neljandas astmes
```

```
>> m = abs(3+4i)
m =
     5
```

>> p = **poly**(A) …
% *characteristic polynomial of matrix A*
p is a vector containingng the coefficients (a_i) of the polynomial ($a_3s^3+a_2s^2+a_1s+a_0 \Rightarrow$ p=[a_3 a_2 a_1 a_0]) – polünoomi esitus

>> r = **roots**(p) % *roots of the polynomial – polünoomi juured*

>> p1 = **conv**(p,p1) % *convolution of the polynomials p and p1 – polünoomide korrutamine*

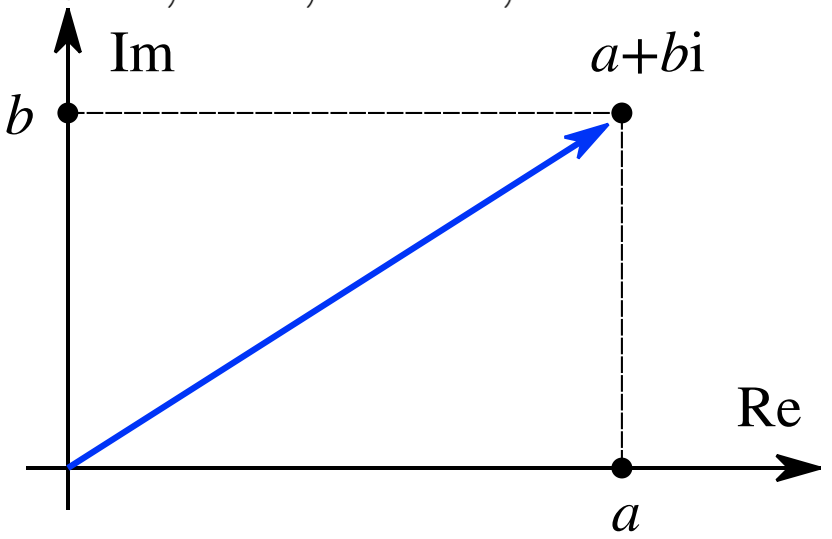
>> **help** *käsk/funktsiooni_nimi*

inv – *pöördmaatriks (inverse of matrix)*

eig – *omaväärtused (eigvalues of matrix)*

Kompleksarvu kuju:

$$z = a + b\mathrm{i}, \quad a, b \in \mathbb{R}, \quad \mathrm{i}^2 = -1.$$



m – fail e. script (käsufail)

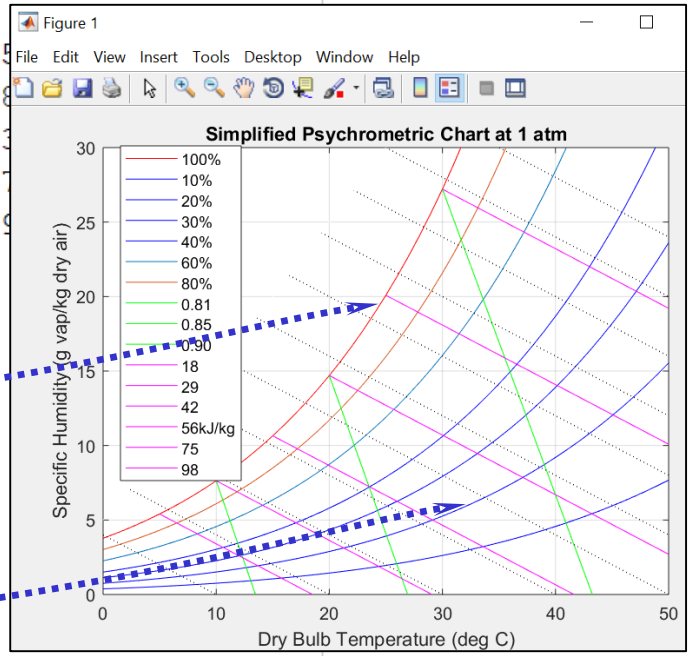
EDITOR | PUBLISH | VIEW

New | Open | Save | Find Files | Compare | Print | Go To | Find | Insert | Comment | Indent | Breakpoints | Run | Run and Advance | Run Section | Advance | Run and Time

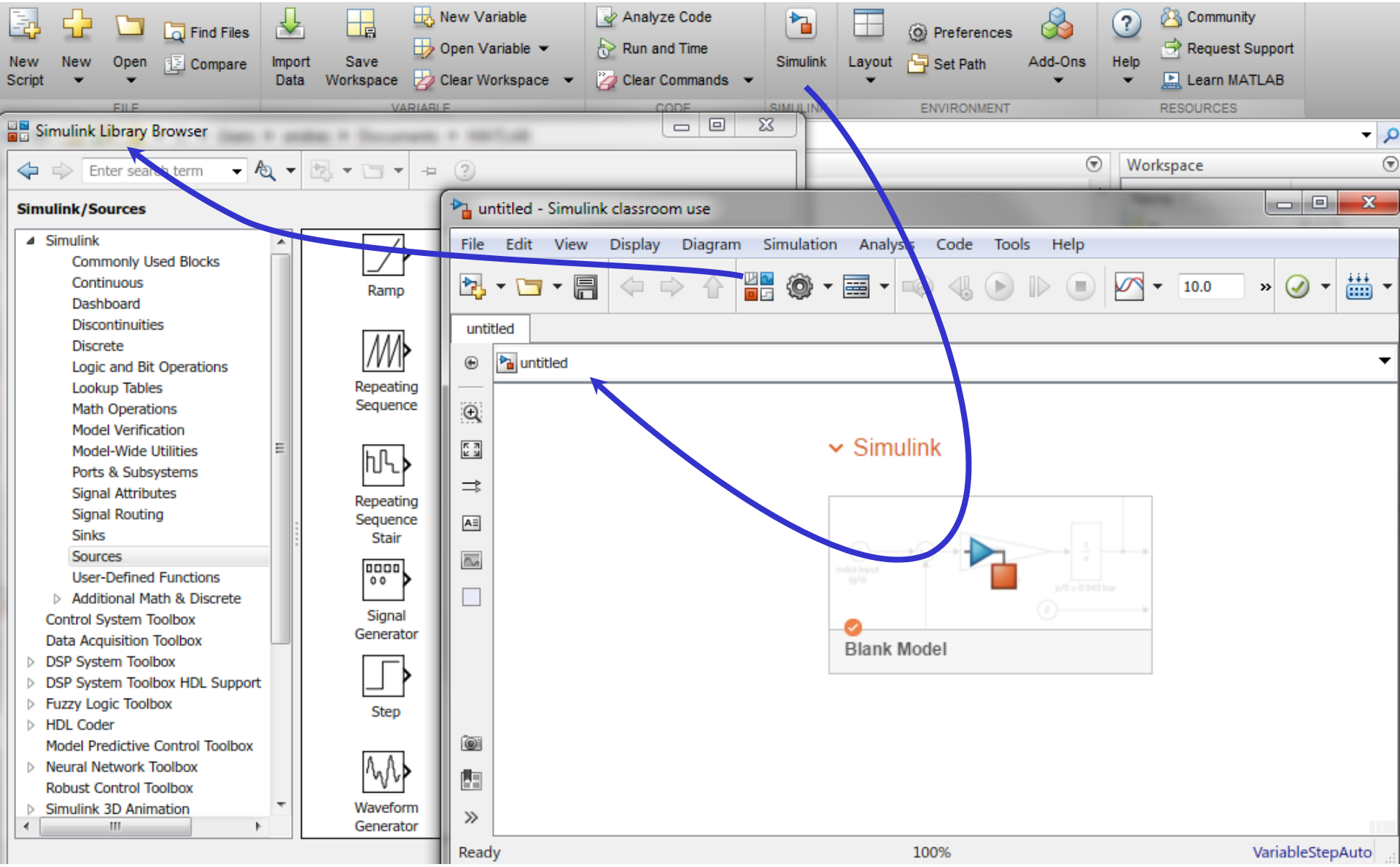
FILE | NAVIGATE | EDIT | BREAKPOINTS | RUN

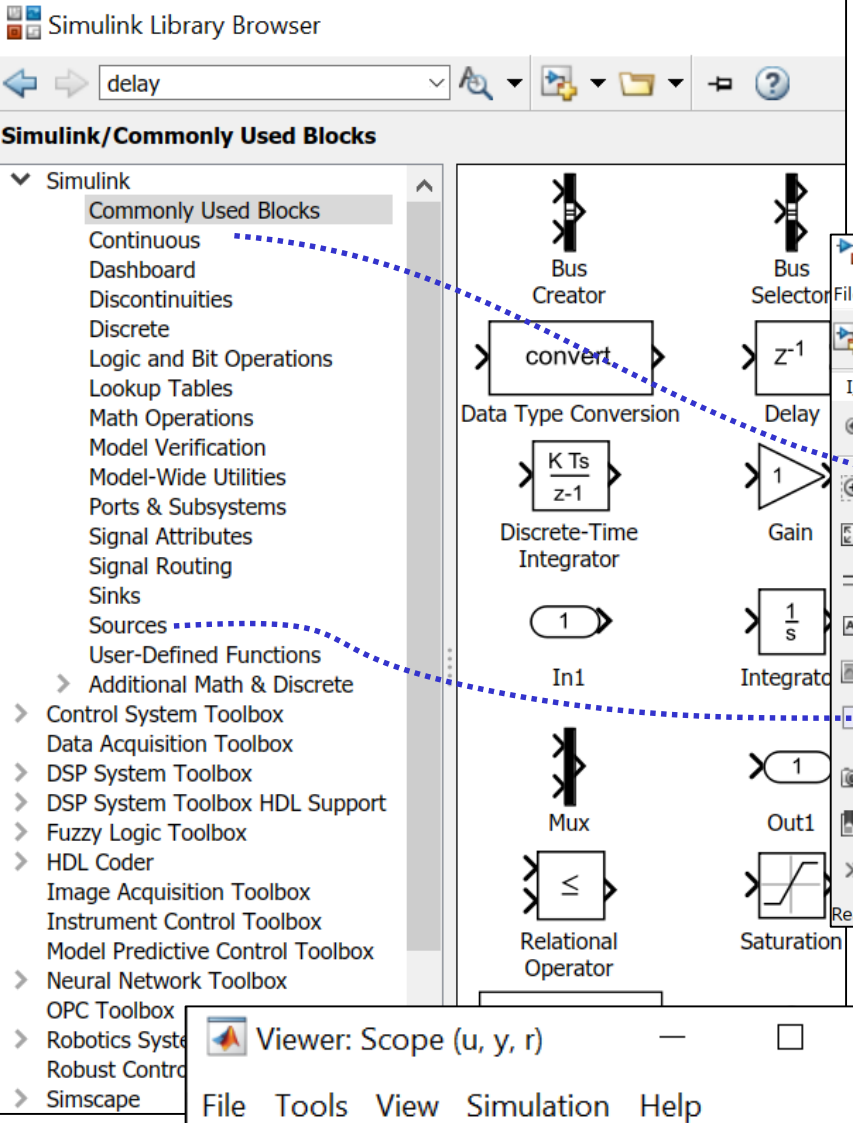
psychro.m

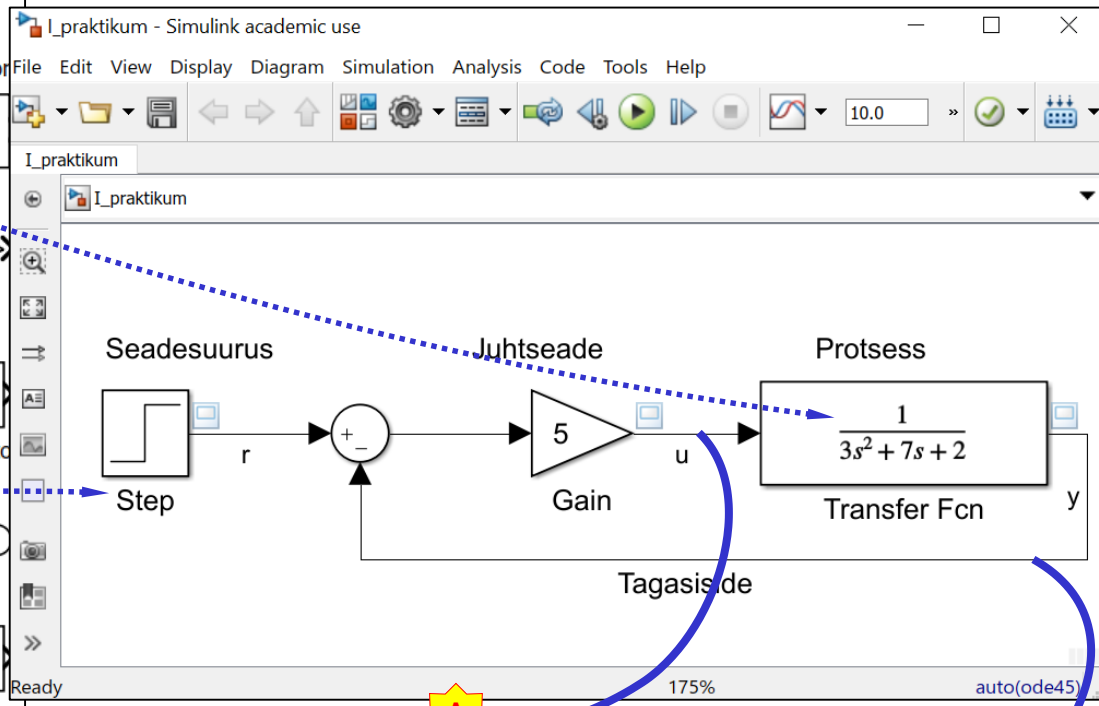
```
% saturation temp/pressure
t = [0.01 1:1:50]'; % temperature (C)
pg = [0.61165 0.65709 0.70599 0.75808 0.81355 0.87258 0.935
      1.22820 1.31300 1.40280 1.49810 1.59900 1.70580 1.818
      2.33930 2.48820 2.64530 2.81110 2.98580 3.16990 3.363
      4.24700 4.49690 4.75960 5.03540 5.32510 5.62900 5.947
      7.38490 7.78780 8.20960 8.65080 9.11240 9.59500 10.09
     12.35200]'; % saturation vapor pressure (kPa)
patm = 101.325; % standard atmosphere (kPa)
rair = 0.287; % gas constant of air (kJ/kg.K)
wg = 622*pg./(patm-pg); % saturation specific humidity
plot(t,wg,'r-')
hold
grid
for phi = 0.1:0.1:0.4, % phi = relative humidity 10% - 40%
    w = 622*phi*pg./(patm-phi*pg);
    plot(t,w,'b-');
end
for phi = 0.6:0.2:0.8, % phi = 60%, 80%
    w = 622*phi*pg./(patm-phi*pg);
    plot(t,w)
axis([0,50,0,30])
legend('100%','10%','20%','30%','40%','60%','80%','0.81','0.85','0.90','18'
title('Simplified Psychrometric Chart at 1 atm')
xlabel('Dry Bulb Temperature (deg C)')
```

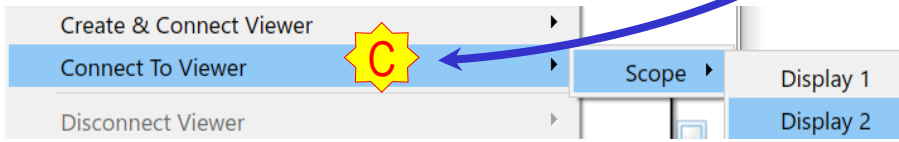


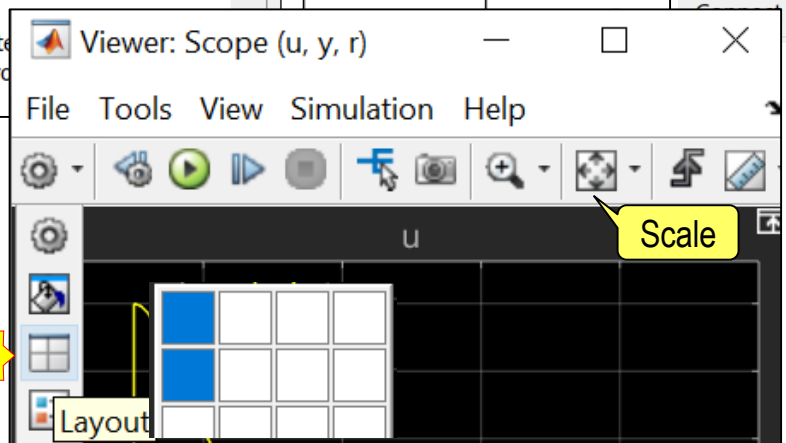
Simulink


New Script
New
Open
Find Files
Compare
Import Data
Save Workspace
New Variable
Open Variable
Clear Workspace
Analyze Code
Run and Time
Clear Commands
Simulink
Layout
Preferences
Set Path
Add-Ons
Help
Community
Request Support
Learn MATLAB
FILE
VARIABLE
CODE
SIMULINK
ENVIRONMENT
RESOURCES
Simulink Library Browser
Enter search term
Simulink/Sources
Simulink
Commonly Used Blocks
Continuous
Dashboard
Discontinuities
Discrete
Logic and Bit Operations
Lookup Tables
Math Operations
Model Verification
Model-Wide Utilities
Ports & Subsystems
Signal Attributes
Signal Routing
Sinks
Sources
User-Defined Functions
Additional Math & Discrete
Control System Toolbox
Data Acquisition Toolbox
DSP System Toolbox
DSP System Toolbox HDL Support
Fuzzy Logic Toolbox
HDL Coder
Model Predictive Control Toolbox
Neural Network Toolbox
Robust Control Toolbox
Simulink 3D Animation
Ramp
Repeating Sequence
Repeating Sequence Stair
Signal Generator
Step
Waveform Generator
Workspace
untitled - Simulink classroom use
File
Edit
View
Display
Diagram
Simulation
Analysis
Code
Tools
Help
10.0
untitled
untitled
Simulink
Blank Model
Ready
100%
VariableStepAuto



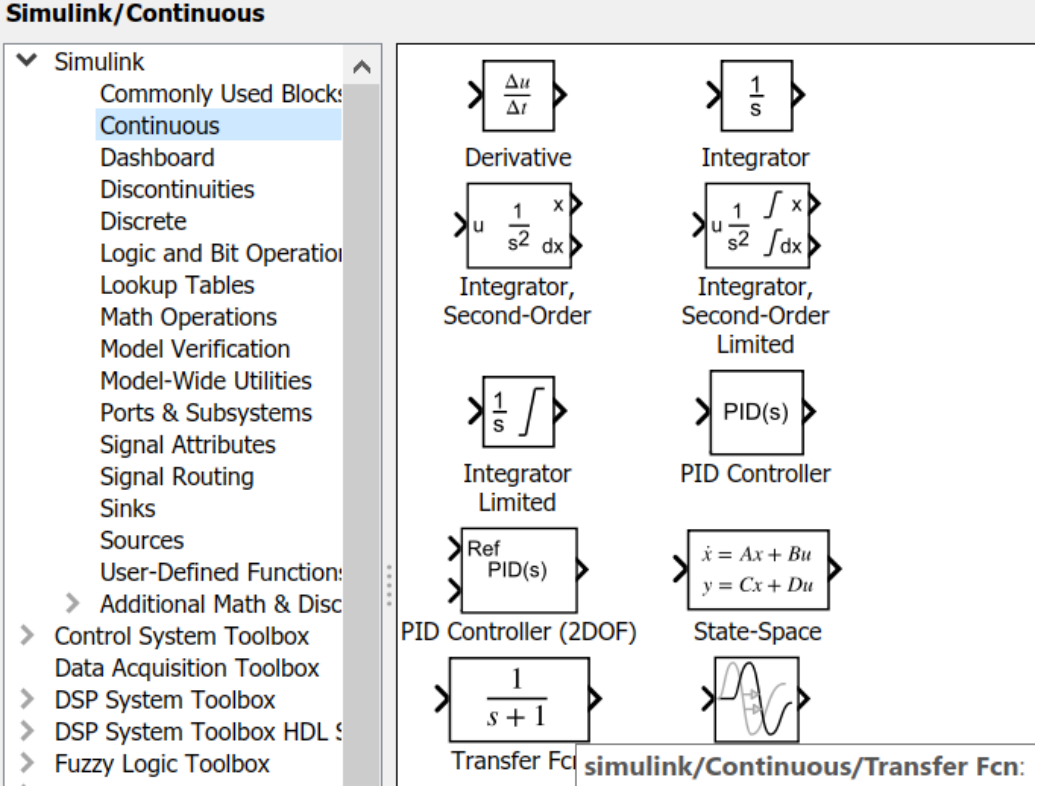






diferentsiaalvõrrand:

$$3\frac{d^2y}{dt^2} + 7\frac{dy}{dt} + 2y(t) = u(t)$$



Block Parameters: Transfer Fcn

Transfer Fcn

The numerator coefficient can be a vector or matrix expression. The denominator coefficient must be a vector. The output width equals the number of rows in the numerator coefficient. You should specify the coefficients in descending order of powers of s.

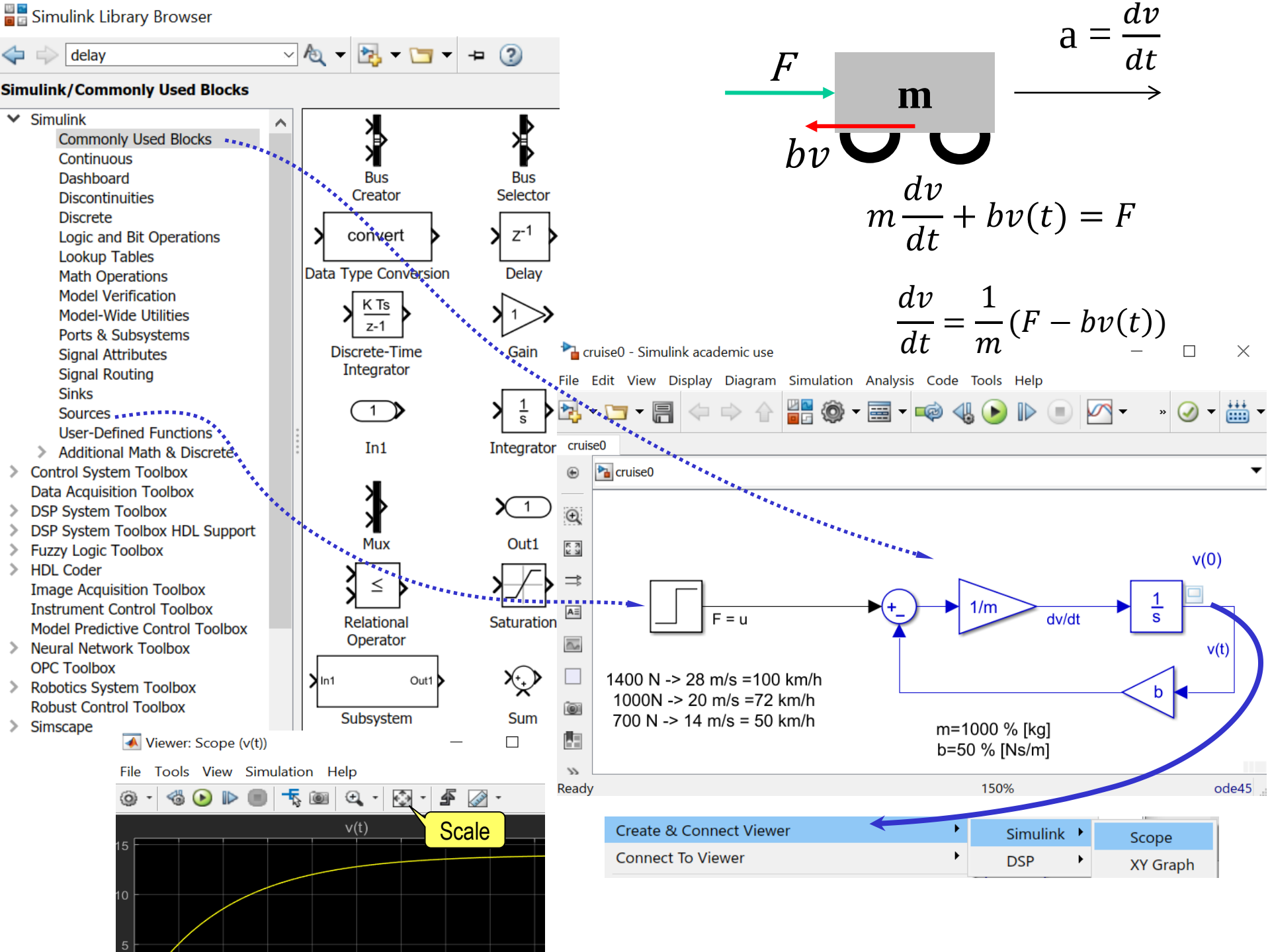
Parameters

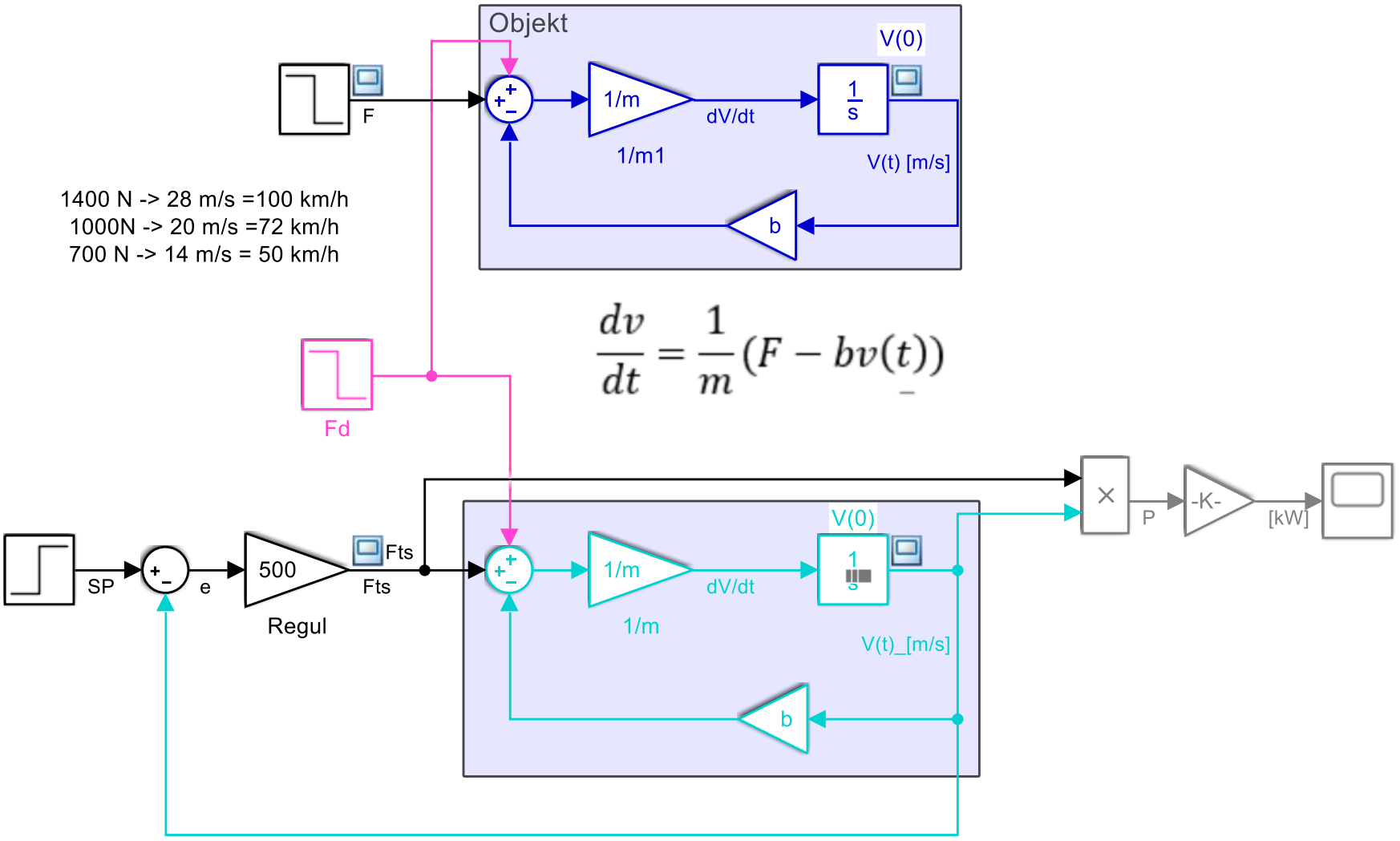
Numerator coefficients:

[1]

Denominator coefficients:

[3 7 2]


Simulink Library Browser
delay
Simulink/Commonly Used Blocks
Simulink
Commonly Used Blocks
Continuous
Dashboard
Discontinuities
Discrete
Logic and Bit Operations
Lookup Tables
Math Operations
Model Verification
Model-Wide Utilities
Ports & Subsystems
Signal Attributes
Signal Routing
Sinks
Sources
User-Defined Functions
Additional Math & Discrete
Control System Toolbox
Data Acquisition Toolbox
DSP System Toolbox
DSP System Toolbox HDL Support
Fuzzy Logic Toolbox
HDL Coder
Image Acquisition Toolbox
Instrument Control Toolbox
Model Predictive Control Toolbox
Neural Network Toolbox
OPC Toolbox
Robotics System Toolbox
Robust Control Toolbox
Simscape
Bus Creator
Bus Selector
convert
Data Type Conversion
Delay
K Ts z-1
Discrete-Time Integrator
Gain
In1
Integrator
Mux
Out1
Relational Operator
Saturation
In1
Out1
Subsystem
Sum
a = dv/dt
F
m
bv
m dv/dt + bv(t) = F
dv/dt = 1/m (F − bv(t))
cruise0 - Simulink academic use
File Edit View Display Diagram Simulation Analysis Code Tools Help
cruise0
cruise0
F = u
1/m
dv/dt
v(0)
v(t)
b
1400 N -> 28 m/s =100 km/h
1000N -> 20 m/s =72 km/h
700 N -> 14 m/s = 50 km/h
m=1000 % [kg]
b=50 % [Ns/m]
Ready
150%
ode45
Viewer: Scope (v(t))
File Tools View Simulation Help
Scale
v(t)
15
10
5
Create & Connect Viewer
Connect To Viewer
Simulink
DSP
Scope
XY Graph



$$\frac{dv}{dt} = \frac{1}{m}(F - bv(t))$$

m=1000 % [kg]
b=50 % [Ns/m]

http://www.engin.umich.edu/group/ctm/examples/cruise/cc.html

Live Editor - C:\Users\Andres\OneDrive - TTU\MATLAB\paak.mlx

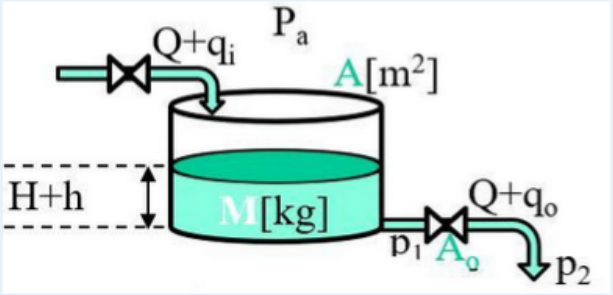
LIVE EDITOR | INSERT | VIEW

New | Open | Save | Find Files | Compare | Print | Go To | Find | Text | Heading | Code | Section Break | Run Section | Run and Advance | Run to End | Run All

FILE | NAVIGATE | TEXT | CODE | SECTION | RUN

paak.mlx

Vaba välja- ja ülevooluga puhverpaagi mudel (vt. nt)



Mahuühikutes:

Q - püsivoog läbi paagi, qi - sissevoolu muutus, qo - väljavoolu muutus [m3/s]

```
H = 3 %püsinivoo (head) [m]
A = 0.46 % nivoo pinna pindala [m2]
Ao = 0.00185 % väljalaske toru ristlõike pindala [m2] algv
g = 9.81; % raskuskiirendus [m/s2]
roo = 1000; % vedeliku tihedus [kg/m3]
```

```
H = 3
A = 0.4600
Ao = 0.0019
```

Massiühikutes $\frac{dM}{dt} = (w_i - w_o)$, vool on võrdeline rõhkude vahega

$w_o = \frac{1}{R}(p_1 - p_2)^{\frac{1}{\alpha}}$, $p_1 = \rho g H(t)$, $p_2 \approx P_a$

ehk $\rho A \frac{dH(t)}{dt} = w_i - \rho A_o \sqrt{2gH(t)}$ [kg/s]