A1 MATLAB® code for determining the capillary rise of water in the tube depicted in Problem1

```
%Determining the capillary rise of water in the tube
%Programmed by Prof. Dr. Kaan Yetilmezsoy
%17 December 2019, Tuesday
%STEP #1
clear, clc
format short
disp(datestr(now,0))
%STEP #2
a1 = {'Capillary tube diameter (mm)','Contact angle (°)',...
 'Water temperature (°C)'};
a2 = 'Inputs';
a3 = [1 40; 1 40; 1 40];
a4 = inputdlg(a1,a2,a3);
tic
%STEP #3
b = char(a4);
c = str2num(b);
d = c(1); theta = c(2); T = c(3); r = d./2; r1 = r/1000;
%STEP #4
%Volume of cylinder of height r and radius r
V1 = (pi*(r1.^2)).*r1; V2 = (2./3).*pi.*(r1.^3);
V3 = V1-V2;
%STEP #5
%Determination of surface tension and specific weight
Ss = (7.56./(10.^2))-(1.21./(10.^4)).*T-(4.51./(10.^6)).*(T.^1.5);
Gw = (2.766./(10.^9)).*(T.^5)-(8.08./(10.^7)).*(T.^4)+...
 (9.91./(10.^5)).*(T.^3)-(9.477./(10.^3)).*(T.^2)+...
 (7.364./(10.^2)).*T+999.845;
%STEP #6
syms h
Vt = V3 + (pi*(r1.^2)).*h;
Fs = 2.*(pi.*r1).*(Ss.*cosd(theta)); %Newton
Fs1 = Fs./9.807; %kgf
Eqn = (Vt.*Gw)-Fs1;
Q = solve(Eqn);
h = double(Q);
%STEP #7
%Convert numbers to character representation
hs = sprintf('Capillary rise = %1.4f cm',h.*100);
msgbox(hs,'Results');
toc
```

A2 MATLAB® code for determining the capillary rise of water in the tube depicted in Problem 2

```
%Determining the safe engine power for an industrial static mixer
%Programmed by Prof. Dr. Kaan Yetilmezsoy
%17 December 2019, Tuesday
%STEP #1
clear, clc
format short
disp(datestr(now,0))
%STEP #2
a1 = {'Reactor volume (m3)','Velocity gradient (1/s)',...
 'Water temperature (°C)','Safety factor'};
```

```
a2 = 'Inputs';
a3 = [1 40; 1 40; 1 40; 1 40];
a4 = inputdlg(a1,a2,a3);
tic
%STEP #3
b = char(a4);
c = str2num(b);
V = c(1); G = c(2); T = c(3); SF = c(4); g = 9.807;
%STEP #4
%Determination of kinematic viscosity and specific weight
nuw = (10.^-6)./(0.555+(2.04./(10.^2)).*T+(8.914./(10.^5)).*(T.^2));
Gw = (2.766./(10.^9)).*(T.^5)-(8.08./(10.^7)).*(T.^4)+...
 (9.91./(10.^5)).*(T.^3)-(9.477./(10.^3)).*(T.^2)+...
 (7.364./(10.^2)).*T+999.845;
%STEP #5
P = (nuw.*(Gw./g)).*(G.^2).*V;
P1 = (P.*9.807)./1000;
Pm = P1.*1.2;
%STEP #6
%Convert numbers to character representation
Pms = sprintf('Safe engine power = %1.4f kW',Pm);
msgbox(Pms,'Results');
toc
```