Set 3.1)

Problem 19

Since there are 7 data points, we could use global cubic spline interpolation or polynomial interpolation over nearest-neighour data points. The following program uses the cubic spline.

```
% problem3_1_19
xData = [0 21.1 37.8 54.4 71.1 87.8 100];
yData = [1.79 1.13 0.696 0.519 0.338 0.321 0.296];
x = [10 30 60 90];
k = splineCurv(xData,yData);
fprintf('Temperature  Viscosity\n')
for T = x
    mu = splineEval(xData,yData,k,T);
    fprintf('%9.0f %13.4f\n',T,mu)
end
```

```
>> Temperature  Viscosity
       10        1.4750
       30        0.8701
       60        0.4541
       90        0.3195
```

Set 3.2)

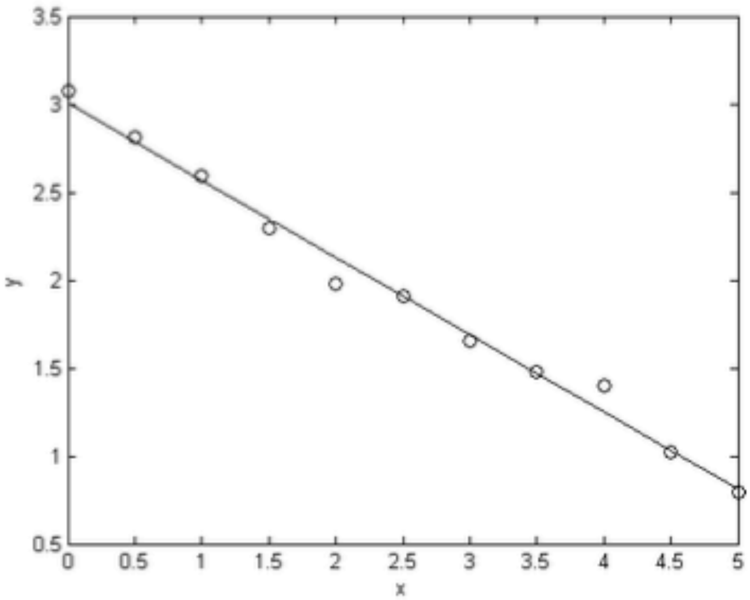
Problem 5

In this and the following problems we use MATlAB's plotting capability to plot the data points and the fitting function.

```
% problem3_2_5
xData = 0:0.5:5;
yData =[3.076 2.810 2.588 2.297 1.981 1.912 ...
        1.653 1.478 1.399 1.018 0.794];
format short e
c = polynFit(xData,yData,2)
std_deviation = stdDev(c,xData,yData)
y = c(2)*ones(length(xData),1) + c(1)*xData';  % Interpolant
plot(xData,yData,'ko'); hold on; plot(xData,y,'k-')
xlabel('x'); ylabel('y')
```

```
>> c =
 -4.3838e-001
  19.7222
  19.4444
  18.3333
  17.0000
  16.0000
```

The equation of the interpolant is $y = 3.0056 - 0.43838x$ (solid line in the figure).



Set 6.1)

Problem 10

$$\begin{aligned}\sin x &= t^2 \qquad \cos x\, dx = 2t\, dt \\ \sqrt{1-\sin^2 x} dx &= 2t dt \qquad dx = \frac{2t}{\sqrt{1-t^4}} dt\end{aligned}$$

$$\int_0^{\pi/4} \frac{dx}{\sqrt{\sin x}} = \int_0^{2^{-1/4}} \frac{2}{\sqrt{1-t^4}} dt$$

```
function p6_1_10
% problem6_1_10
f = inline('2/sqrt(1 - x^4)','x');
a = 0; b = 1/sqrt(sqrt(2));
I = romberg(f,a,b)
end
```

```
I =

    1.7912
```