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EDL207G Verk 4

```
err = 0.01;
```

3.1

```
innraVid = 53; %ohm
```

3.2

1-3

```
v_r = 0.6047; %volt
```

4

```
R = 5e3;
```

```
C = 10e-9;
```

```
v_r = [2.88 2.4 1.6 1.08 0.72 0.48 0.36 0.24];
```

```
t = [0 10 30 50 70 90 110 130]*1e-6;
```

```
k = 1/((R+innraVid)*C)
```

```
slope = polyfit(v_r, t, 1);
```

```
slope = slope(1)
```

```
v_rerror = v_r.*err;
```

```
terror = t.*err;
```

```
kMes = (log(v_r(1))-log(v_r)).*t.^-1
```

```
kMesErr = 1./(t.*v_r).*v_rerror+(log(v_r(1))-log(v_r))./t.^2.*terror
```

```
tau = 1./kMes
```

```
figure(1)
```

```
errorbar(t,v_r,v_rerror,v_rerror,terror,terror); hold on;
```

```
x = linspace(0, 150e-6, 100);
```

```
mdl = v_r(1)*exp(-k.*x);
```

```
plot(x,mdl)
```

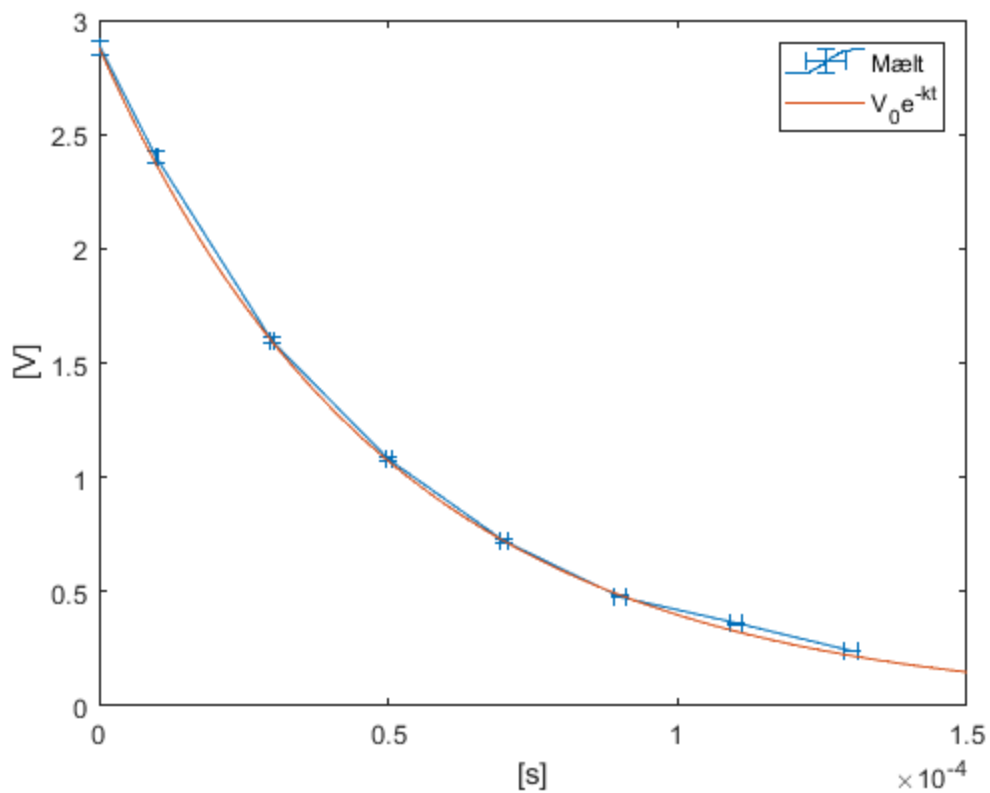
```

hold off;

xlabel('[s]')
ylabel('[V]')
legend('Mælt', 'V_0e^{-kt}')

k =
    1.9790e+04
slope =
    -4.5142e-05
kMes =
    Columns 1 through 6
        NaN    1.8232e+04    1.9593e+04    1.9617e+04    1.9804e+04    1.9908e+04
    Columns 7 through 8
        1.8904e+04    1.9115e+04
kMesErr =
    Columns 1 through 6
        NaN    1.1823e+03    5.2926e+02    3.9617e+02    3.4090e+02    3.1020e+02
    Columns 7 through 8
        2.7995e+02    2.6807e+02
tau =
    Columns 1 through 6
        NaN    5.4848e-05    5.1039e-05    5.0977e-05    5.0494e-05    5.0230e-05
    Columns 7 through 8
        5.2899e-05    5.2316e-05

```



3.3

1

```
R = 110;
L = 10e-3;

t = [16 48 79.5 112 142 173.5 204.5 236.5]*1e-6;
v_r = [0.576 -0.432 0.328 -0.24 0.176 -0.128 0.096 -0.072];
terror = t.*err;
v_rerror = v_r.*err;

% figure(2);

% errorbar(t,v_r, v_rerror,v_rerror,terror,terror);

t_md1 = linspace(0,2.4e-4,1e5);
b = R/(2*L)

R = 110;
omega_0 = ((1/(L*C))^0.5)
omega_e = (omega_0^2-b^2)^0.5

syms A l;
eq1 = A*exp(-l*t(1))*sin(omega_0*t(1)) == v_r(1);
eq2 = A*exp(-l*t(7))*sin(omega_0*t(7)) == v_r(7);
And1 = solve([eq1 eq2], [A l]);
lambda = double(And1.l)
A = double(And1.A)

f2 = @(p) p(1) * sin(p(2) * t_md1 - p(3)) .* exp(-p(4) * t_md1);
%      v_r(1)*1.19      omega_0      0      lambda
p20 = [A      omega_0      0      lambda]

hold on;
% plot(t_md1, f2(p20));
hold off;

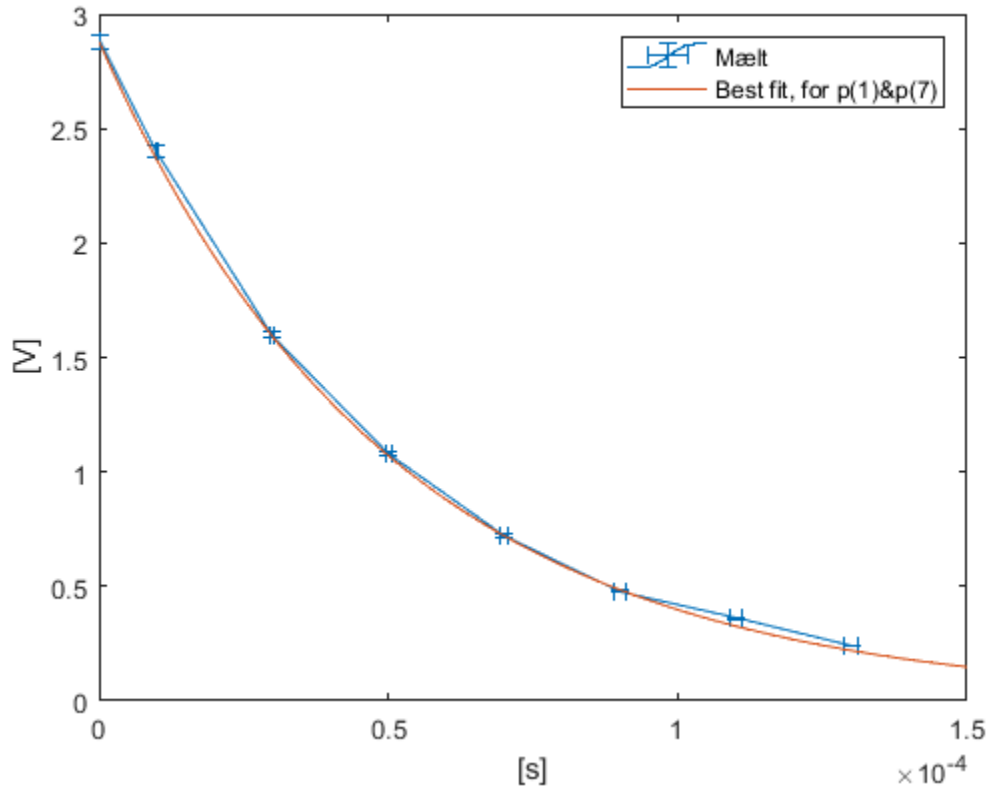
xlabel('[s]')
ylabel('[V]')
legend('Mælt', 'Best fit, for p(1)&p(7)')

b =
    5500
omega_0 =
    100000
omega_e =
    9.9849e+04
lambda =
    9.5053e+03
A =
```

```

        6.7090e-01
p20 =
        6.7090e-01    1.0000e+05    0    9.5053e+03

```



2

```

n = 0:0.5:3.5;
x0 = linspace(0, 2.49e-4);
y0 = polyval(polyfit(t,n,1), x0);
fig3 = figure(3);
yyaxis left
errorbar(t,n,zeros(1,8),zeros(1,8),error,error,'b-','LineWidth',0.1);
hold on;
plot(x0,y0,'r--','LineWidth', 0.1)
yyaxis right
plot(t_md1, f2(p20),'g-','LineWidth',0.1);
errorbar(t,v_r, v_error,v_error,error,error,'k-','LineWidth',0.1);

hold off;

yyaxis left
xlabel('[s]')
ylabel('[n]')

gca.YColor = 'k'

```

```

legend('Best fit, for p(1)&p(7)', 'Mælt', 'Mælt', 'Best fit', 'Position',[0.5
    0.7 0.1 0.2])
yyaxis right

gca.YColor = 'b'

ylabel('[V]')

n = 1:0.5:4.5;
mesOmega_e = 2*pi./t.*(n+1/4)

gca =
    struct with fields:

        YColor: 'k'
gca =
    struct with fields:

        YColor: 'b'
mesOmega_e =
    Columns 1 through 6
    4.9087e+05    2.2907e+05    1.7783e+05    1.5427e+05    1.4381e+05    1.3580e+05
    Columns 7 through 8
    1.3058e+05    1.2620e+05

```

