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CH2MP1.m : Chapter 2, MATLAB Program 1

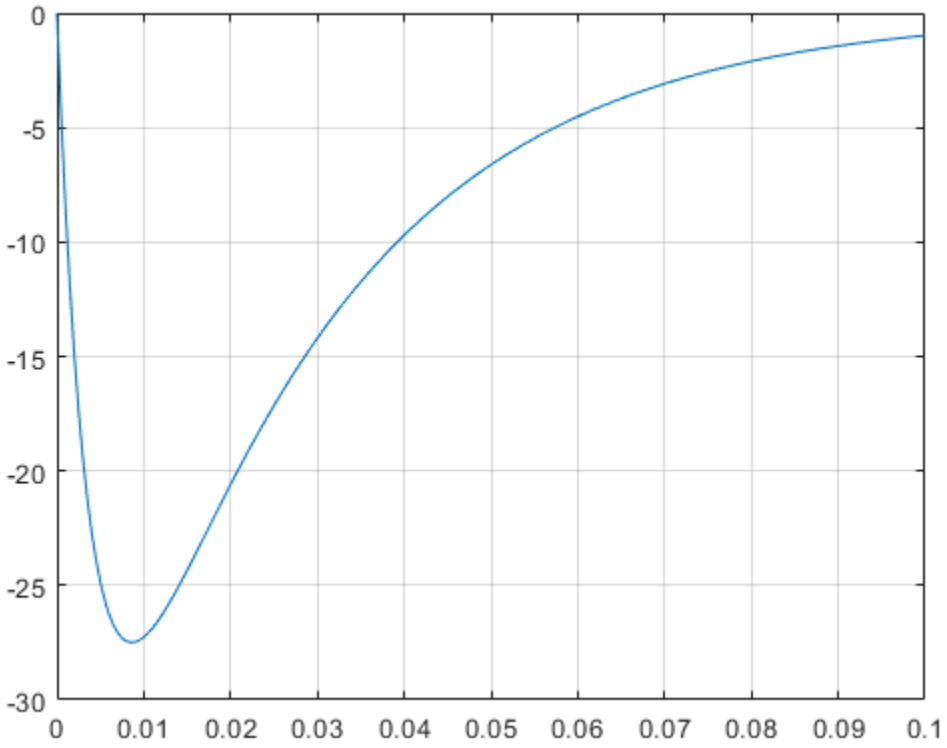
Script M-file determines characteristic roots of op-amp circuit. Set component values:

```
R = [1e4, 1e4, 1e4]; C = [1e-6, 1e-6];
% Determine coefficients for characteristic equation:
A = [1, (1/R(1)+1/R(2)+1/R(3))/C(2), 1/(R(1)*R(2)*C(1)*C(2))];
% Determine characteristic roots:
lambda = roots(A);
poly(lambda)
lambda = roots(A)

R = [1e4, 1e4, 1e4]; C = [1e-9, 1e-6];
% Determine coefficients for characteristic equation:
A = [1, (1/R(1)+1/R(2)+1/R(3))/C(2), 1/(R(1)*R(2)*C(1)*C(2))];
% Determine characteristic roots:
lambda = roots(A);
poly(lambda)
lambda = roots(A)


ans =

   1.0e+04 *

    0.0001    0.0300    1.0000


lambda =

 -261.8034
  -38.1966


ans =

   1.0e+07 *

    0.0000    0.0000    1.0000


lambda =
```

```
   1.0e+03 *

  -0.1500 + 3.1587i
  -0.1500 - 3.1587i
```

A.2

```
R = [1e4, 1e4, 1e4]; C = [1e-6, 1e-6];
% Determine coefficients for characteristic equation:
A = [1, (1/R(1)+1/R(2)+1/R(3))/C(2), 1/(R(1)*R(2)*C(1)*C(2))];
% Determine characteristic roots:
lambda = roots(A);
t = [0:0.0005:0.1];
u = @(t) 1.0.*(t>=0);
h = @(t) (-44.7214.*exp(lambda(2).*t) +
 44.7214.*exp(lambda(1).*t)).*(u(t));
plot(t,h(t));
grid;
```



A.3

```
%Below shows new characteristic roots with C = [1e-9, 1e-6]
lambda = CH2MP2_1([1e4, 1e4, 1e4],[1e-9, 1e-6])
```

```
lambda =

   1.0e+03 *

  -0.1500 + 3.1587i
  -0.1500 - 3.1587i
```

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