Frequency Domain Analysis (1A)

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10/29/14

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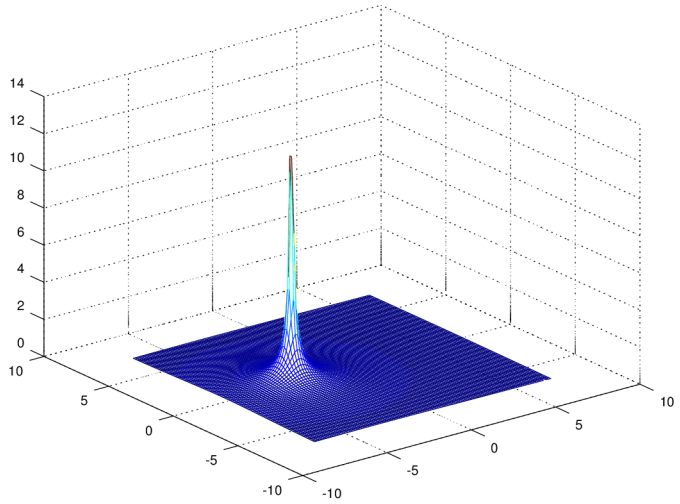
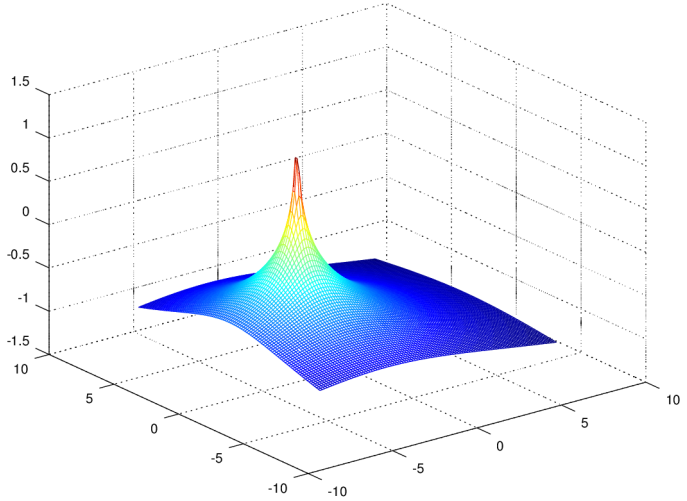
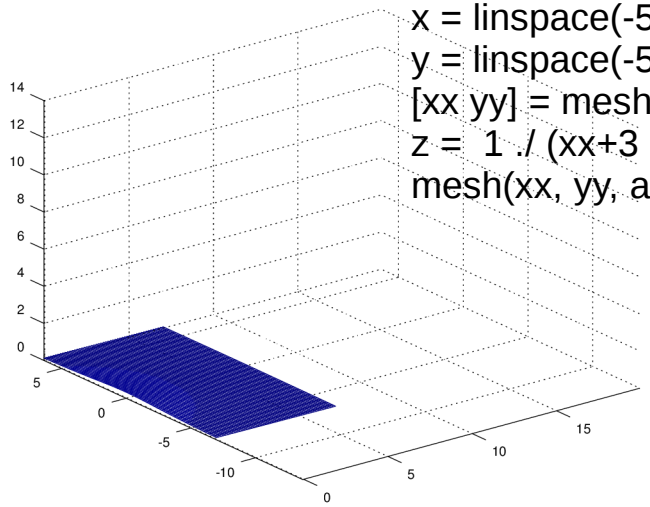
This document was produced by using OpenOffice and Octave.

Magnitude Response : G(s) = 1 / (s + 3)

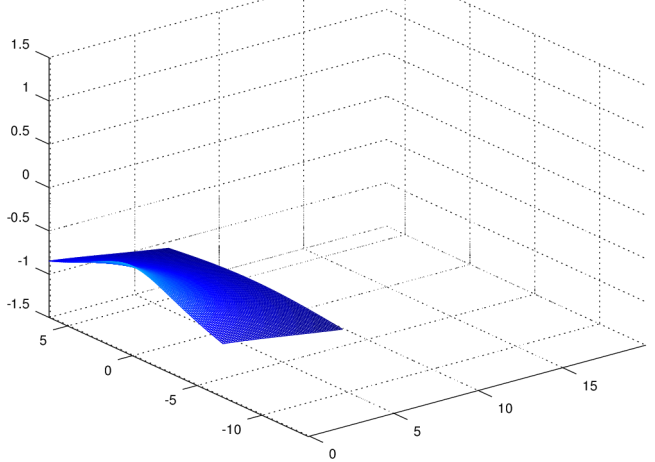


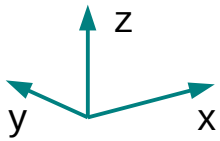




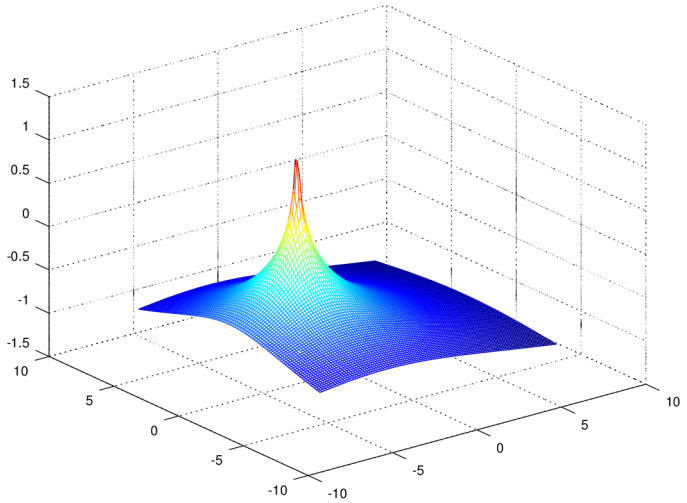
```
x = linspace(-5, +5, 100);
y = linspace(-5, +5, 100);
[xx yy] = meshgrid(x, y);
z =  1 ./ (xx+3 + i*yy);
mesh(xx, yy, abs(z))
```

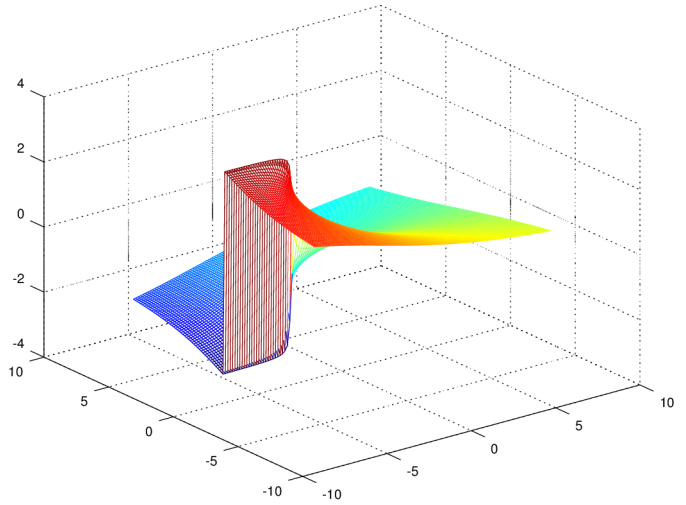
mesh(xx, yy, log10(abs(z)))



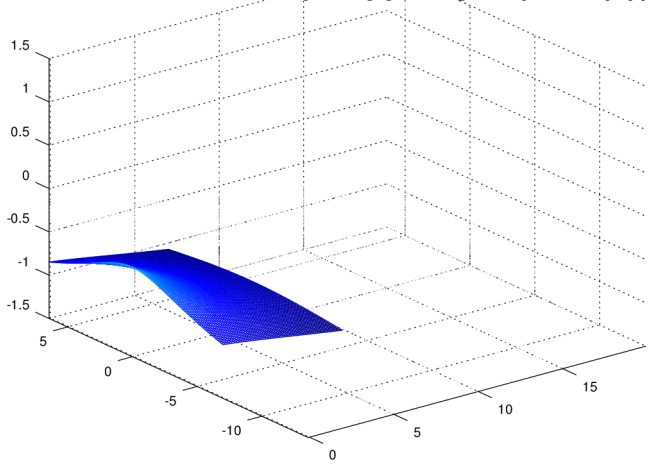


Magnitude & Phase Response : G(s) = 1 / (s + 3)

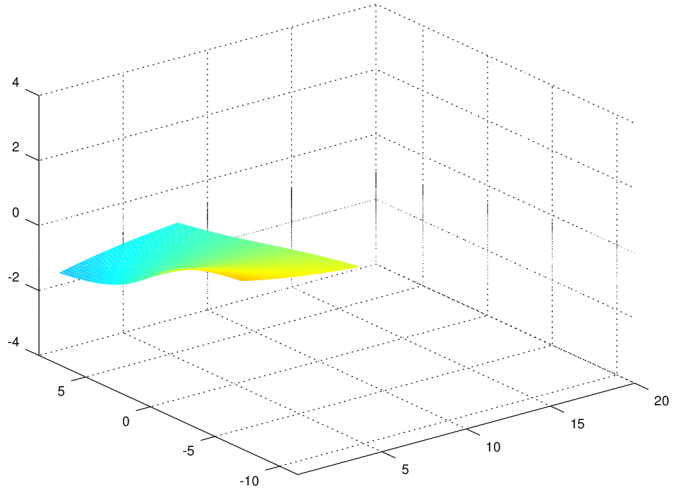


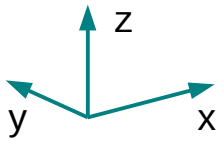


mesh(xx, yy, log10(abs(z)))



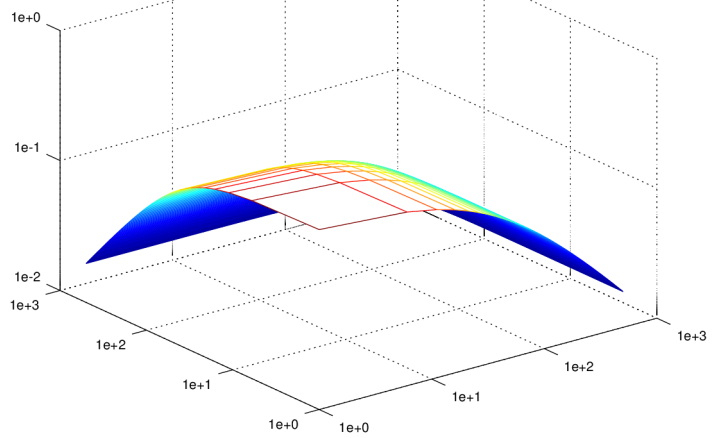
mesh(xx, yy, arg(z))



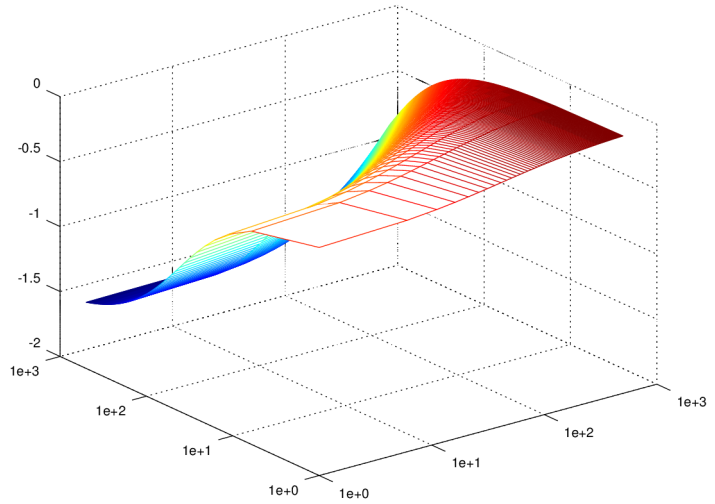


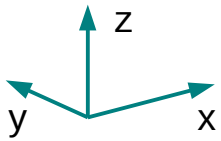
Log-log Scale Response : G(s) = 1 / (s + 3)

set(gca, 'xscale', 'log', 'yscale', 'log', 'zscale', 'log')

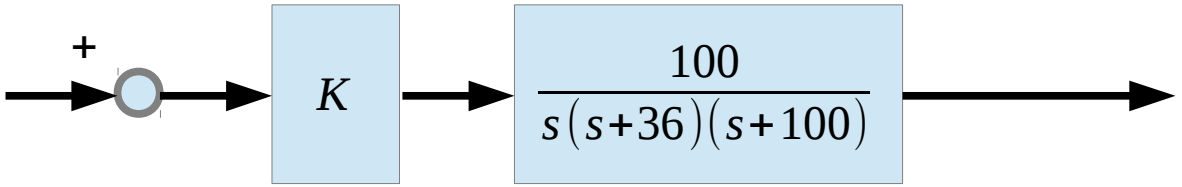


set(gca, 'xscale', 'log', 'yscale', 'log')

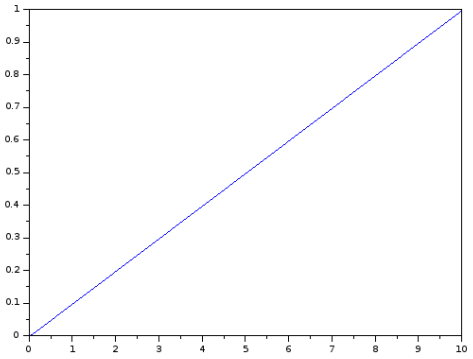


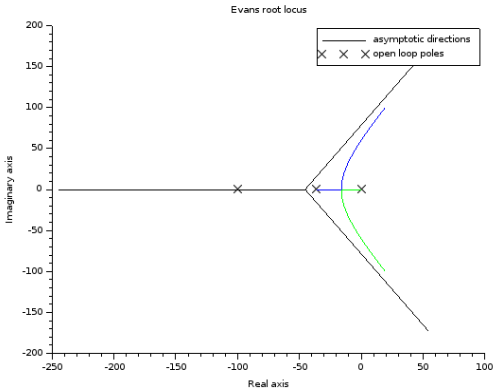


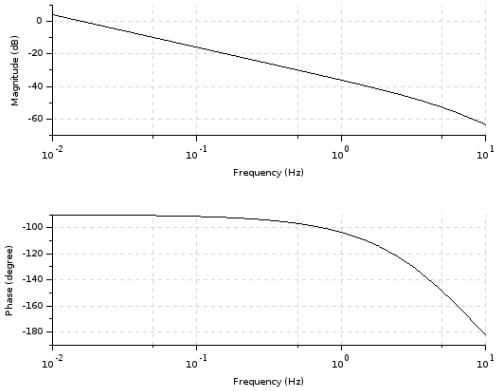
Open Loop G(S) = 100 / s(s+36)(s+100)



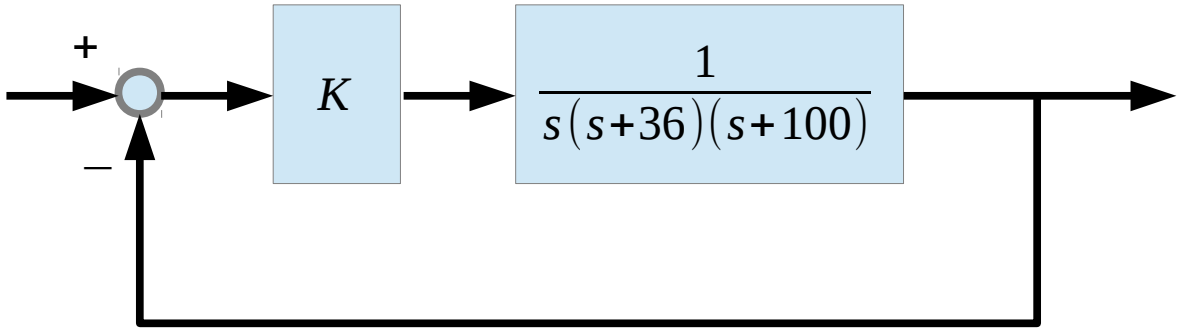
$$K = 3.6$$



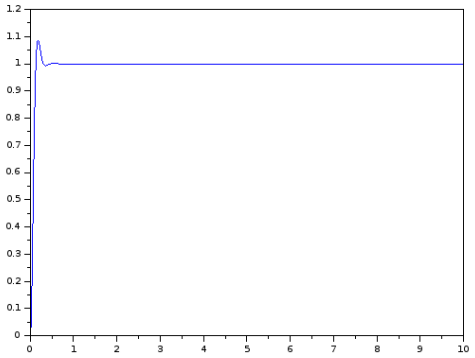


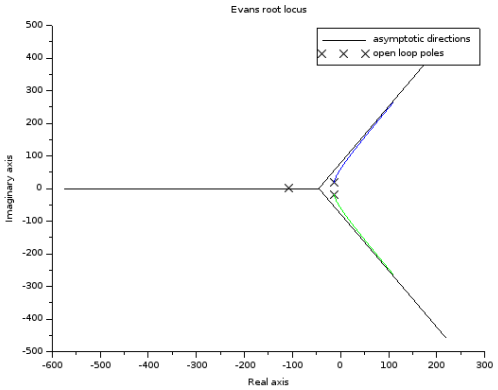


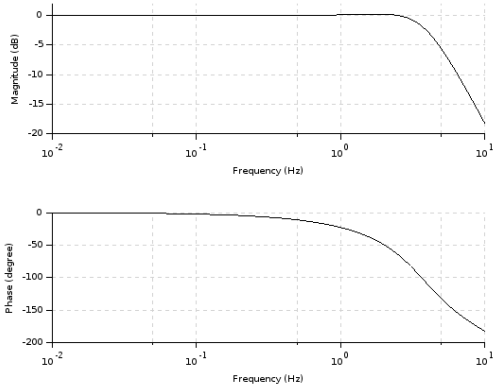
Closed Loop T(s) = KG(s) / (1+KG(s))



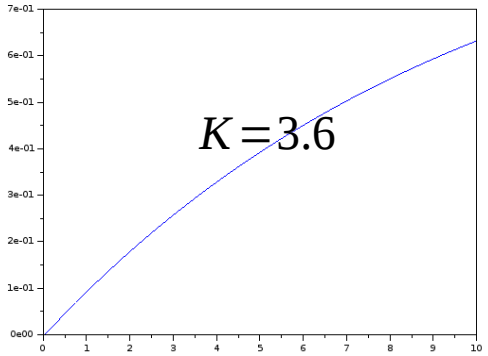
$$K = 583.9$$

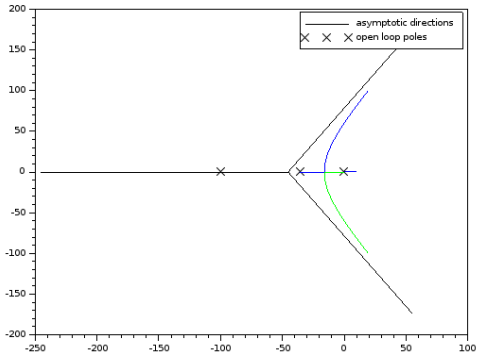


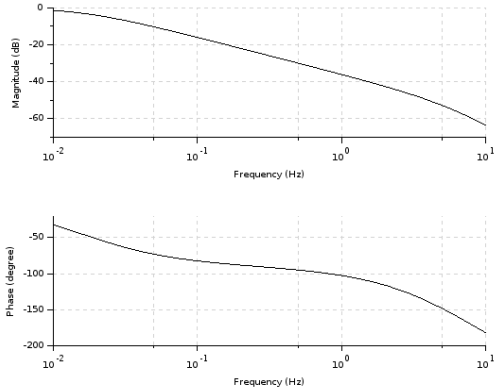


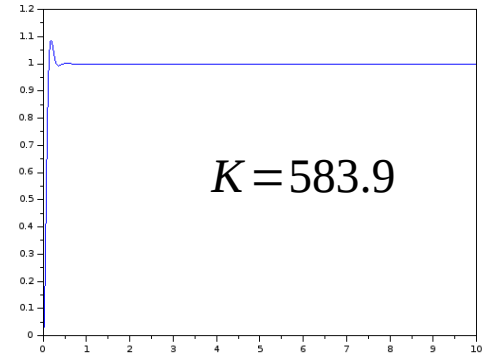


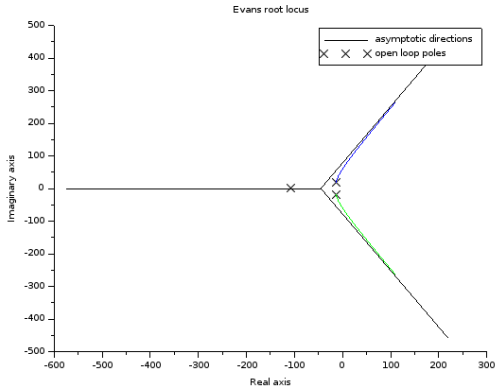
Log-log Scale Response : G(s) = 1 / (s + 3)

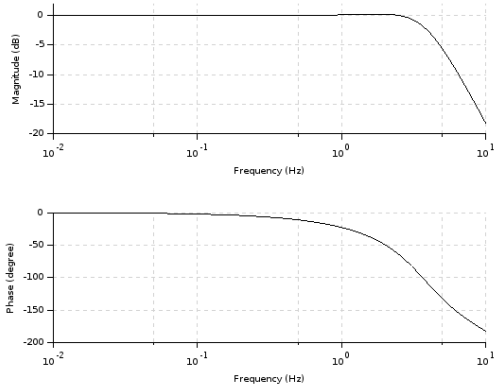












Scilab Code

```
K=3.6;
G = 100*K/(s*(s+36)*(s+100));
sys_ol = syslin('c', G);
t = 0:0.01:10;
y1 = csim('step', t, sys_ol);
plot(t, y1);
evans(y1);
bode(sys_ol, 0.01, 10);
```

```
K=583.9;
G = 100*K/(s*(s+36)*(s+100));
sys_cl = syslin('c', G/(1+G));
t = 0:0.01:10;
y1 = csim('step', t, sys_cl);
plot(t, y1);
evans(y1);
bode(sys_cl, 0.01, 10);
```

References

[1] http://en.wikipedia.org/
[2] M.L. Boas, “Mathematical Methods in the Physical Sciences”
[3] E. Kreyszig, “Advanced Engineering Mathematics”
[4] D. G. Zill, W. S. Wright, “Advanced Engineering Mathematics”