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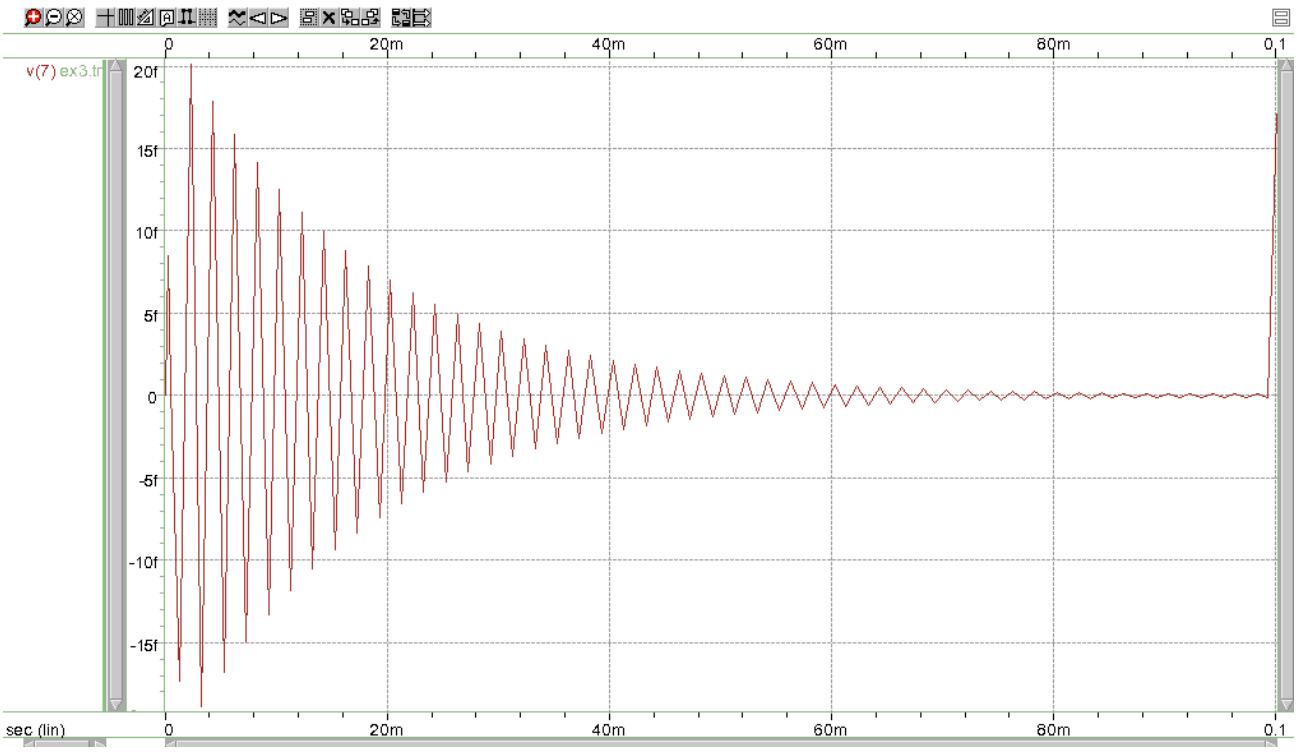
April 8, 2016

Prelab MOSFET 2

Exercise 3

ex3.sp

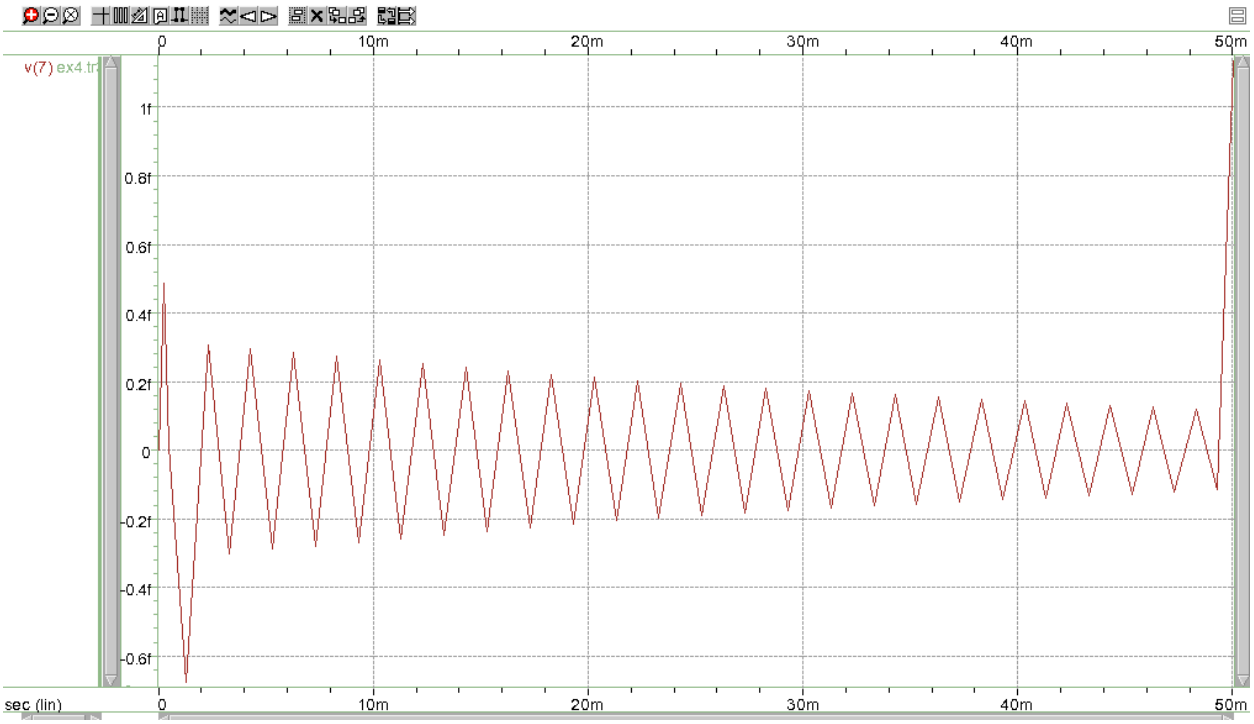
```
Exercise 3
.opt post
*MOSFET model description
.MODEL NMOS2N7000 NMOS(LEVEL=3
+Rs=0.205 NSUB=1.0e15 DELTA=0.1
+KAPPA=0.0506 TPG=1 CGDO=3.1716e-9
+RD=0.239 VTO=1 VMAX=1.0e7
+ETA=0.0223089 NFS=6.6e10 TOX=1.0e-5
+LD=1.698e-9 UO=862.425 XJ=6.4666e-7
+THETA=1.0e-5 CGSO=9.09e-9)
*Voltage Source
Vs 1 0 SIN(0V 50mV 10kHz)
V1 3 0 DC 5V
V2 6 0 DC 5V
*MOSFET
M1 5 2 4 4 NMOS2N7000 L=2.5e-6 W=0.8e-2
*Circuit Description
Rb1 3 2 1k
Rd 6 5 1.5k
Rb2 2 0 3k
Rss 4 0 500
R1 7 0 1k
C1 1 2 10e-9
C2 5 7 10e-9
.TRAN 1ms 100ms 0ms 1ms
.PLOT V(R1)
.end
```


v(7) ex3.tr
20f
15f
10f
5f
0
-5f
-10f
-15f
0
20m
40m
60m
80m
0.1
sec (lin)

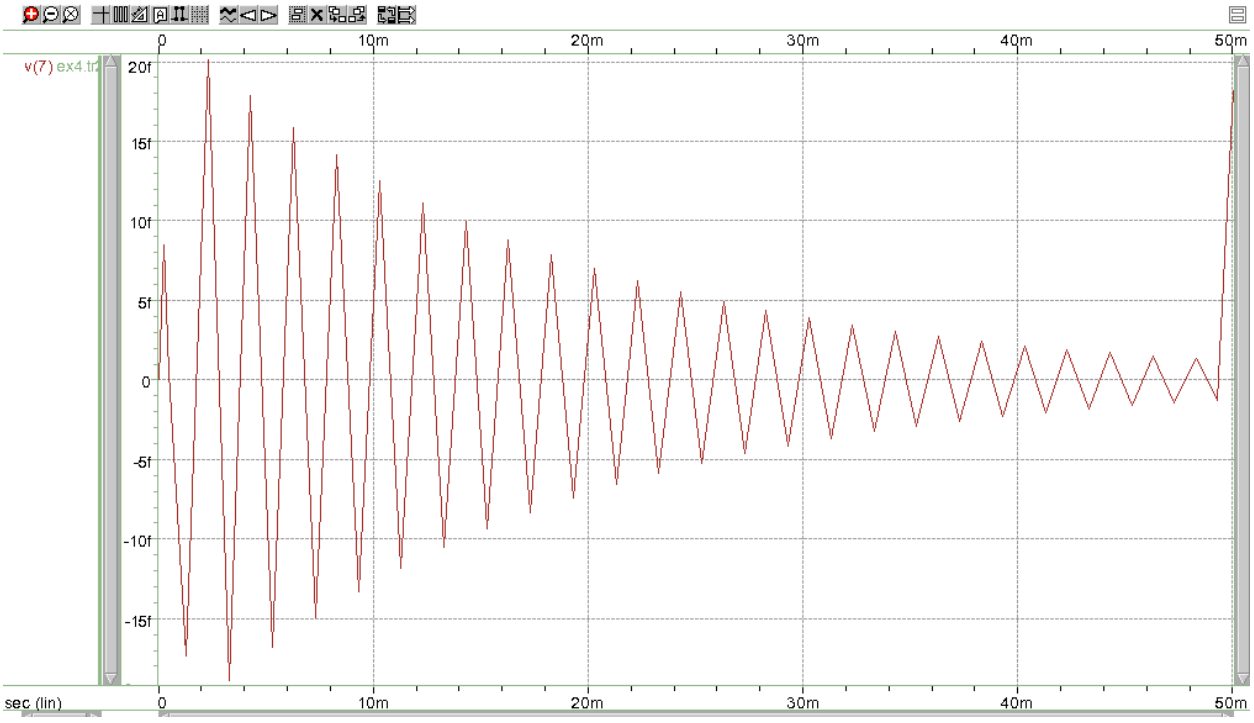
Exercise 4

ex4.sp

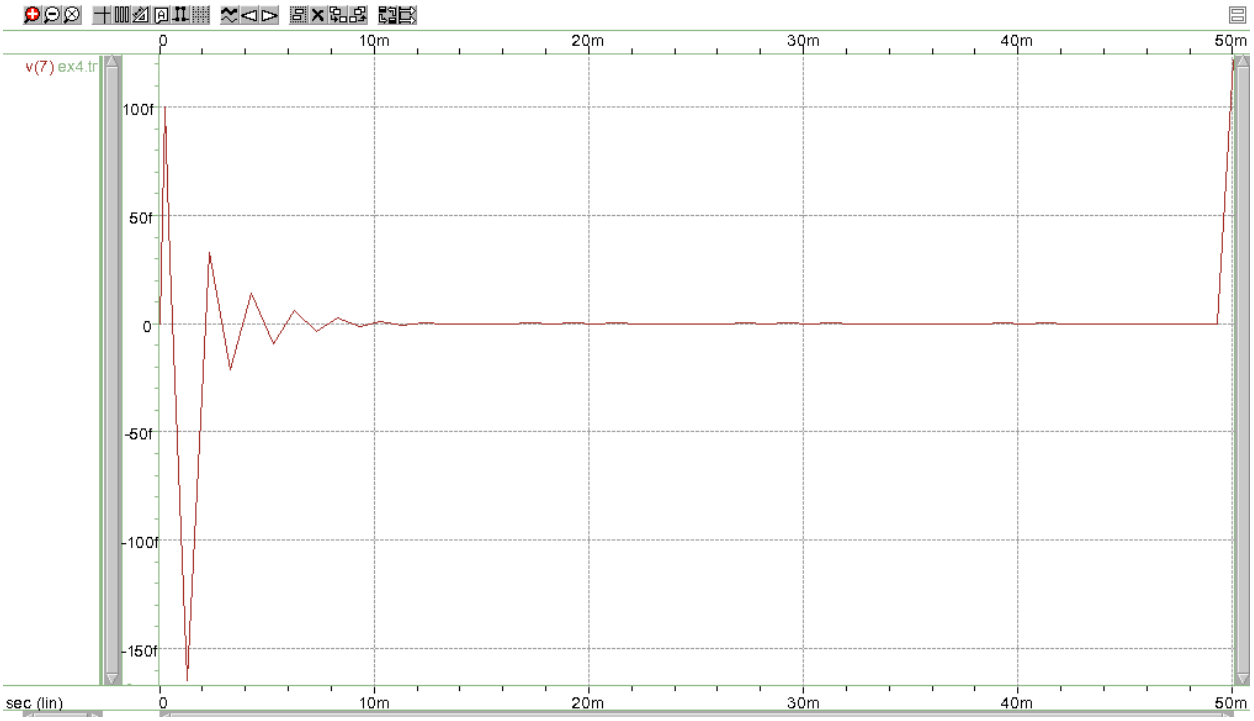
```
Exercise 4
.opt post
*MOSFET model description
.MODEL NMOS2N7000 NMOS(LEVEL=3
+Rs=0.205 NSUB=1.0e15 DELTA=0.1
+KAPPA=0.0506 TPG=1 CGDO=3.1716e-9
+RD=0.239 VTO=1 VMAX=1.0e7
+ETA=0.0223089 NFS=6.6e10 TOX=1.0e-5
+LD=1.698e-9 UO=862.425 XJ=6.4666e-7
+THETA=1.0e-5 CGSO=9.09e-9)
*Voltage Source
Vs 1 0 SIN(0V 50mV 10kHz)
V1 3 0 DC 5V
V2 6 0 DC 5V
M1 5 2 4 4 NMOS2N7000 L=2.5e-6 W=0.8e-2
*Circuit Description
Rb1 3 2 1k
Rd 6 5 1.5k
Rb2 2 0 3k
Rss 4 0 500
R1 7 0 r1val
.param r1val = 100k
C1 1 2 10e-9
C2 5 7 10e-9s
.TRAN 1ms 50ms 0ms 1ms
.PLOT V(R1)
.alter
.param r1val = 10k
.alter
.param r1val = 1k
.alter
.param r1val = 100
.end
```


v(7) ex4.tr
0
10m
20m
30m
40m
50m
1f
0.8f
0.6f
0.4f
0.2f
0
-0.2f
-0.4f
-0.6f
sec (lin)

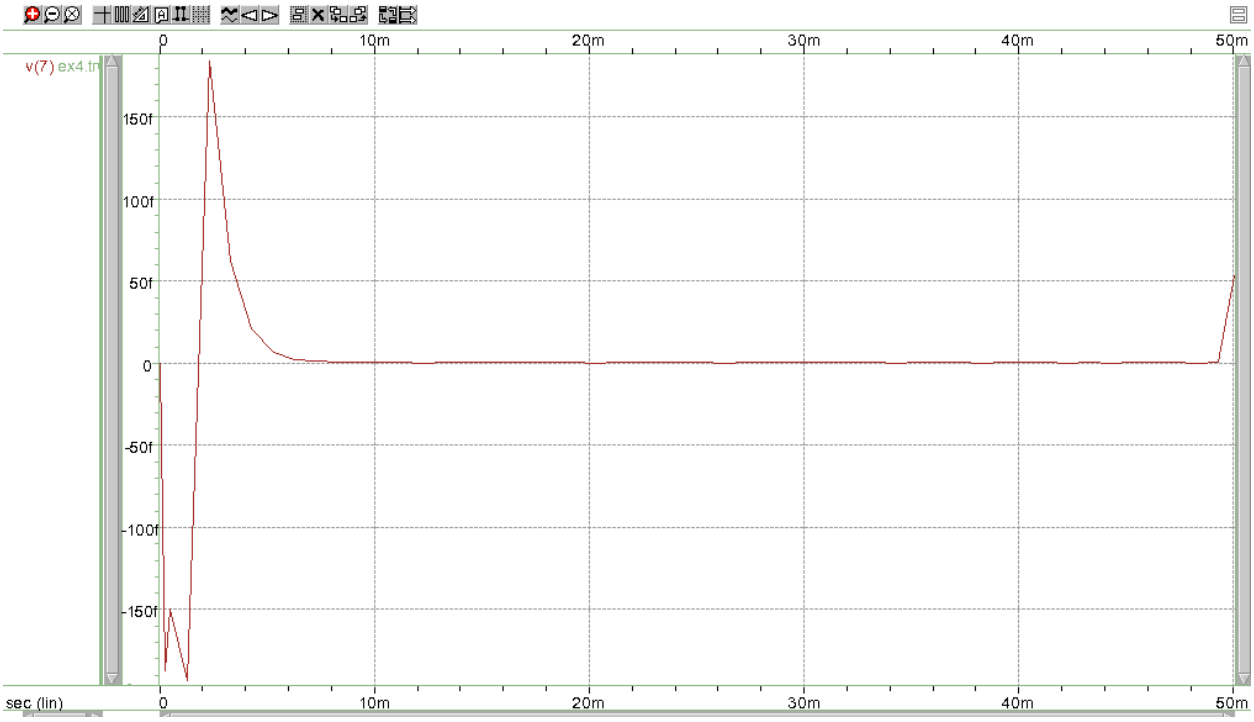
100 Ω


v(7) ex4.tr
0
10m
20m
30m
40m
50m
20f
15f
10f
5f
0
-5f
-10f
-15f
sec (lin)

1 kΩ


v(7) ex4.tr
0
10m
20m
30m
40m
50m
100f
50f
0
-50f
-100f
-150f
sec (lin)

10 kΩ

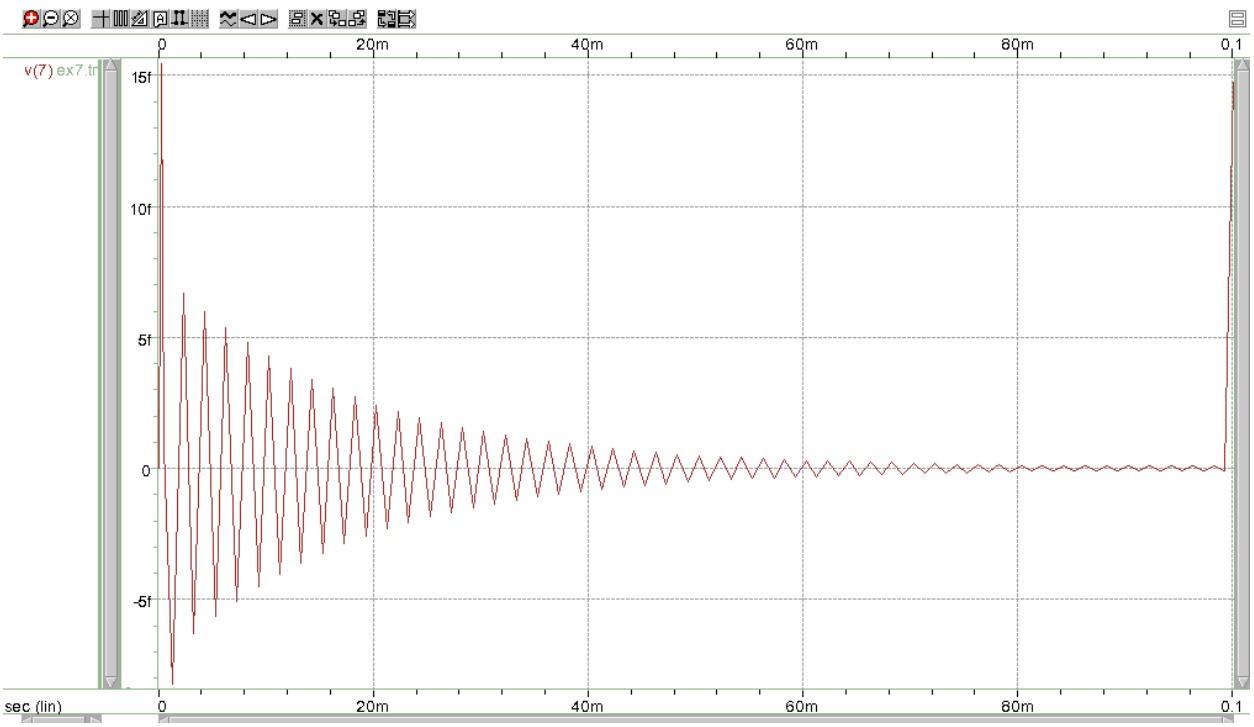

v(7) ex4.tr
0
10m
20m
30m
40m
50m
150f
100f
50f
0
-50f
-100f
-150f
sec (lin)

100 kΩ

Exercise 7

ex7.sp

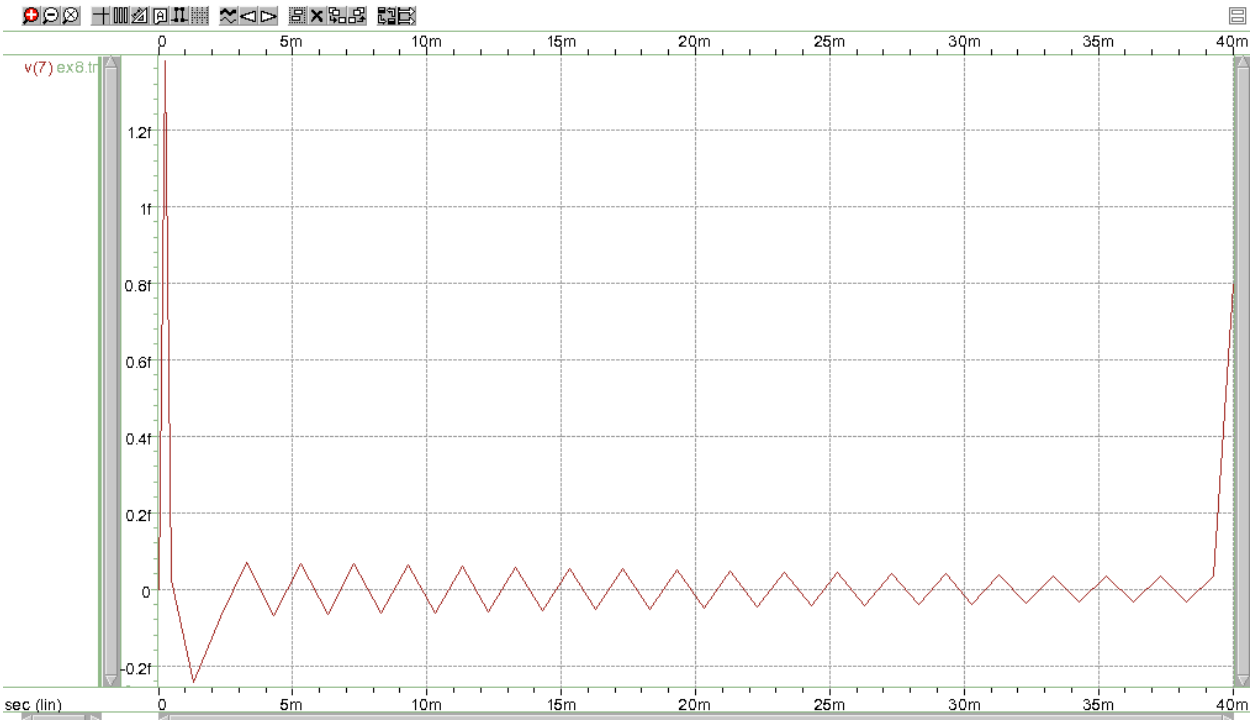
```
Exercise 7
.opt post
*MOSFET model description
.MODEL NMOS2N7000 NMOS(LEVEL=3
+Rs=0.205 NSUB=1.0e15 DELTA=0.1
+KAPPA=0.0506 TPG=1 CGDO=3.1716e-9
+RD=0.239 VTO=1 VMAX=1.0e7
+ETA=0.0223089 NFS=6.6e10 TOX=1.0e-5
+LD=1.698e-9 UO=862.425 XJ=6.4666e-7
+THETA=1.0e-5 CGSO=9.09e-9)
*Voltage Source
Vs 1 0 SIN(0V 50mV 10kHz)
V1 3 0 DC 5V
V2 6 0 DC 5V
*MOSFET
M1 5 2 4 4 NMOS2N7000 L=2.5e-6 W=0.8e-2
*Circuit Description
Rb1 3 2 1k
Rd 6 5 1.5k
Rb2 2 0 3k
Rss 4 0 500
R1 7 0 1k
C1 1 2 10e-9
C2 4 7 10e-9
.TRAN 1ms 100ms 0ms 1ms
.PLOT V(R1)
.end
```


v(7) ex7.tr
15f
10f
5f
0
-5f
0
20m
40m
60m
80m
0.1
sec (lin)

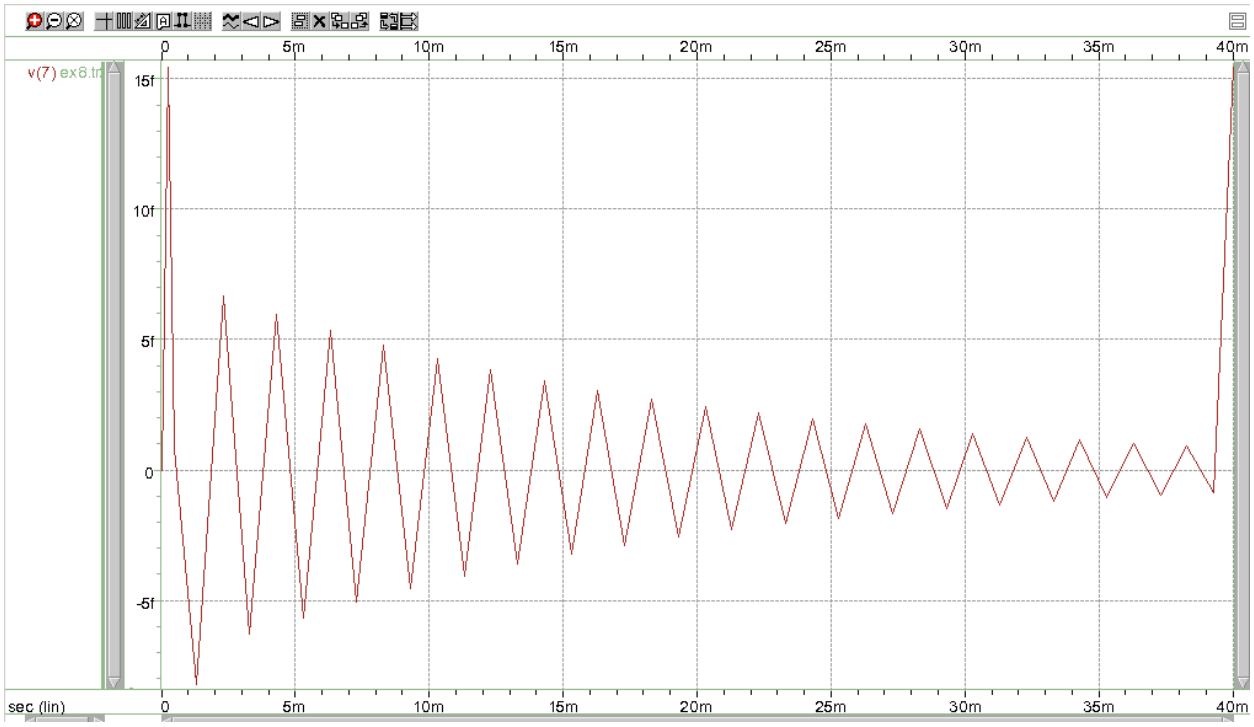
Exercise 8

ex8.sp

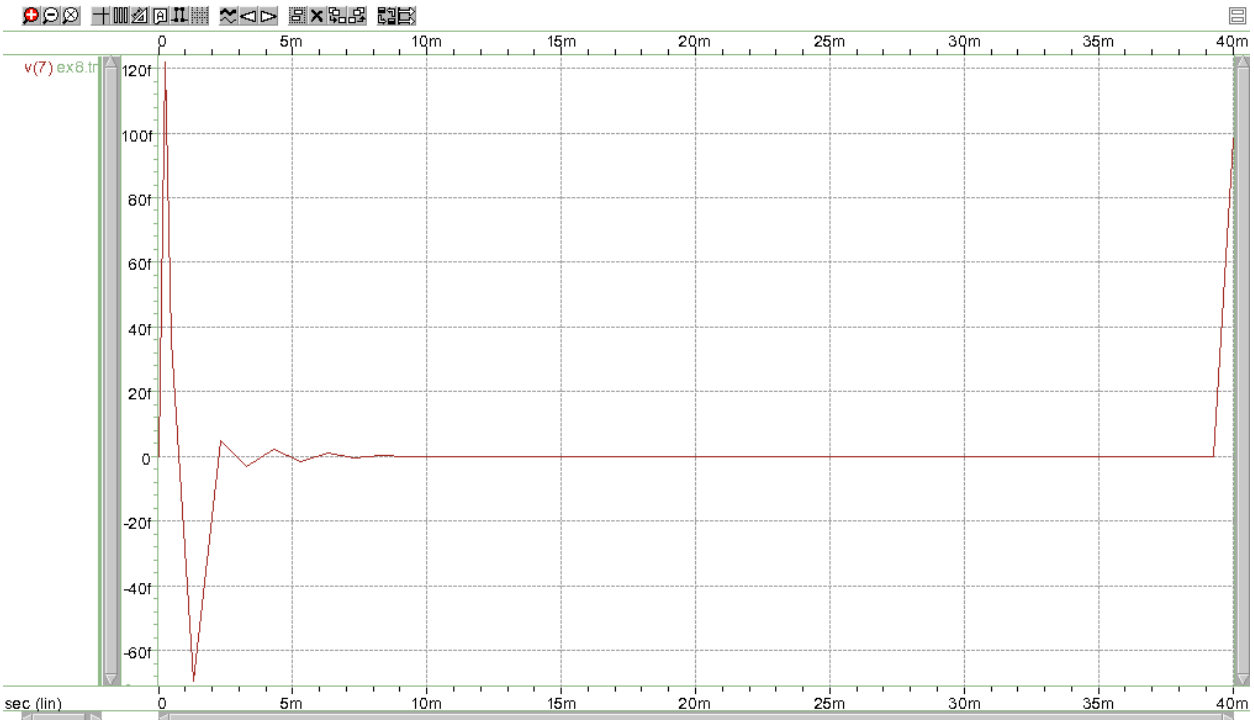
```
Exercise 8
.opt post
*MOSFET model description
.MODEL NMOS2N7000 NMOS(LEVEL=3
+Rs=0.205 NSUB=1.0e15 DELTA=0.1
+KAPPA=0.0506 TPG=1 CGDO=3.1716e-9
+RD=0.239 VTO=1 VMAX=1.0e7
+ETA=0.0223089 NFS=6.6e10 TOX=1.0e-5
+LD=1.698e-9 UO=862.425 XJ=6.4666e-7
+THETA=1.0e-5 CGSO=9.09e-9)
*Voltage Source
Vs 1 0 SIN(0V 50mV 10kHz)
V1 3 0 DC 5V
V2 6 0 DC 5V
M1 5 2 4 4 NMOS2N7000 L=2.5e-6 W=0.8e-2
Rb1 3 2 1k
Rd 6 5 1.5k
Rb2 2 0 3k
Rss 4 0 500
R1 7 0 r1val
.param r1val = 100k
C1 1 2 10e-9
C2 4 7 10e-9
.TRAN 1ms 40ms 0ms 1ms
.PLOT V(R1)
.alter
.param r1val = 10k
.alter
.param r1val = 1k
.alter
.param r1val = 100
.end
```


v(7) ex8.tr
0
5m
10m
15m
20m
25m
30m
35m
40m
1.2f
1f
0.8f
0.6f
0.4f
0.2f
0
-0.2f
sec (lin)

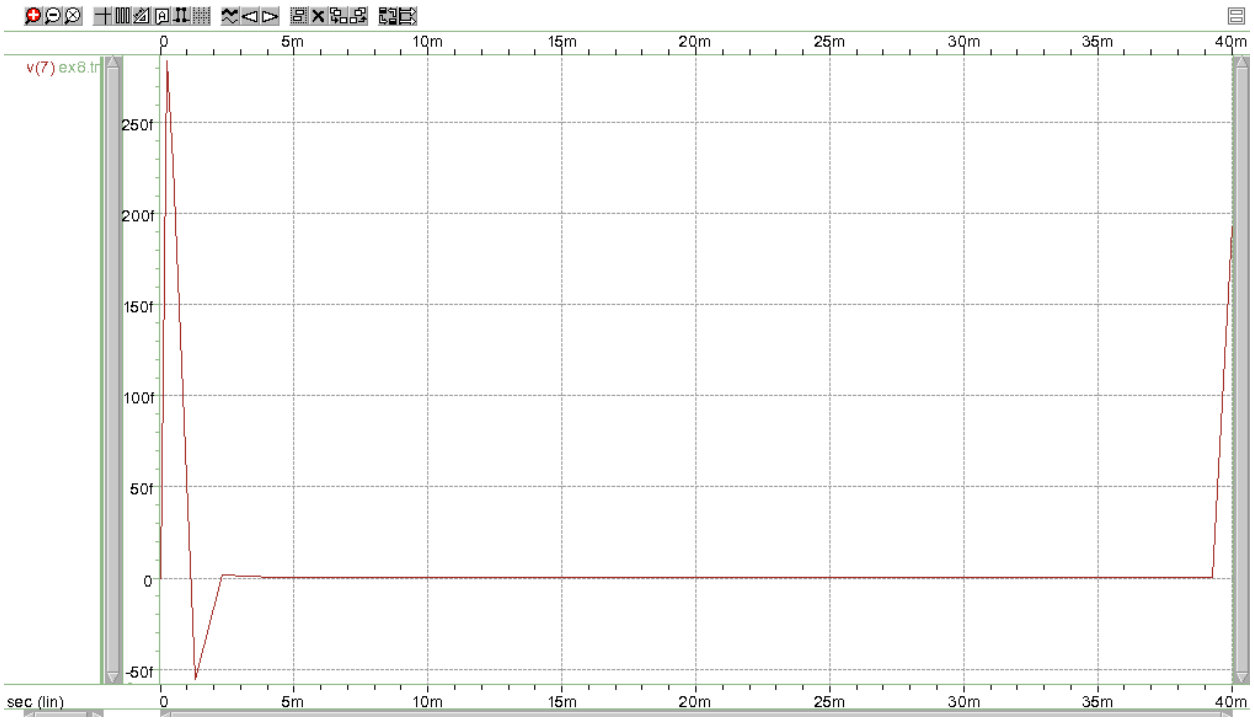
100 Ω


v(7) ex8.tr
0
5m
10m
15m
20m
25m
30m
35m
40m
15f
10f
5f
0
-5f
sec (lin)

1 kΩ


v(7) ex8.tr
120f
100f
80f
60f
40f
20f
0
-20f
-40f
-60f
0
5m
10m
15m
20m
25m
30m
35m
40m
sec (lin)

10 kΩ


v(7) ex8.tr
250f
200f
150f
100f
50f
0
-50f
0
5m
10m
15m
20m
25m
30m
35m
40m
sec (lin)

100 kΩ