SIMON FRASER UNIVERSITY
SCHOOL OF ENGINEERING SCIENCE

ENSC 220
ELECTRIC CIRCUITS I

Midterm Examination No. 1
October 14, 1998

Attempt all four problems. Problems are equally weighted.

1. Derive the expression relating the voltage to the current at the terminals A-B. Plot the result.

2. Find the Thévenin's equivalent at the terminals x-y. Find the maximum power that can be delivered to an appropriate resistor R_x connected across x-y.

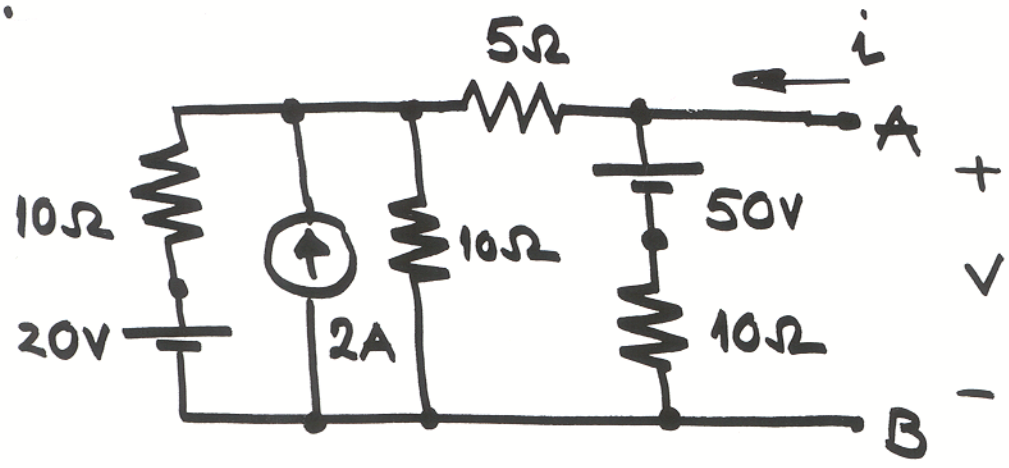
3. Find the voltage and the current in the diode if its v-i characteristics is as shown. What would be your answer if the diode was modeled as an ideal on-off switch?

4. Solve only one of the two cases:

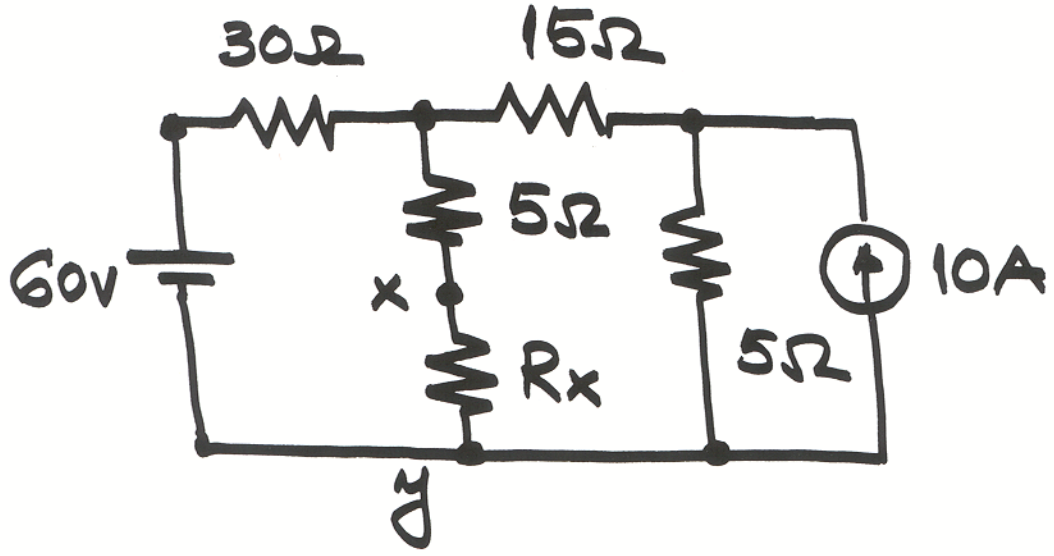
   (a) The waveform of the current in a 2H inductor is shown. Sketch to scale the voltage v across the inductor. What is the source voltage v_s that can produce such current. Show your equations.

   (b) The waveform of the current (in μA) in a 2 μF capacitor is shown. Sketch to scale the voltage v across the capacitor. What is the source voltage v_s that can produce such current. Show your equations.

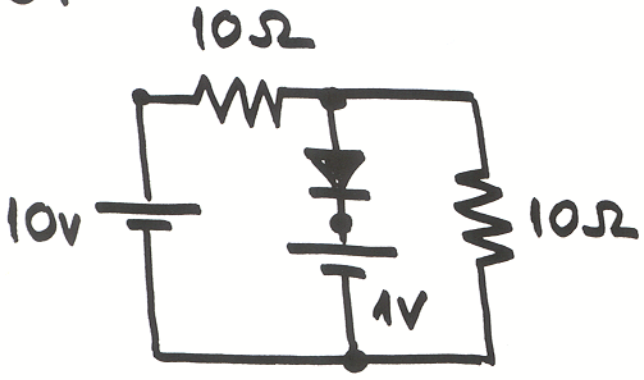
1.

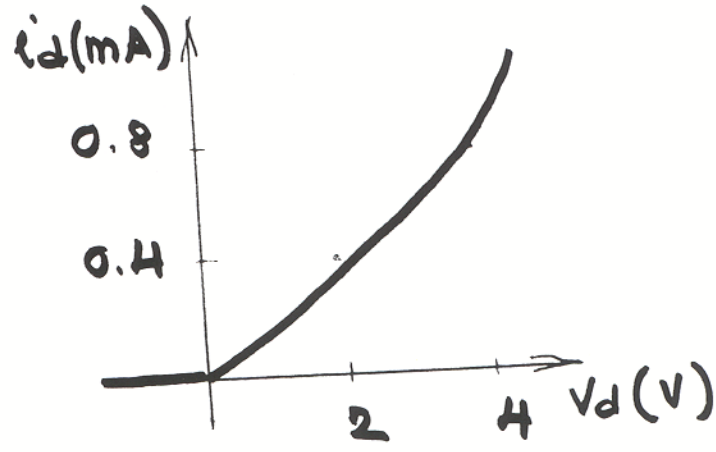

5Ω
i
A
10Ω
10Ω
50V
+
V
20V
2A
10Ω
−
B

2.

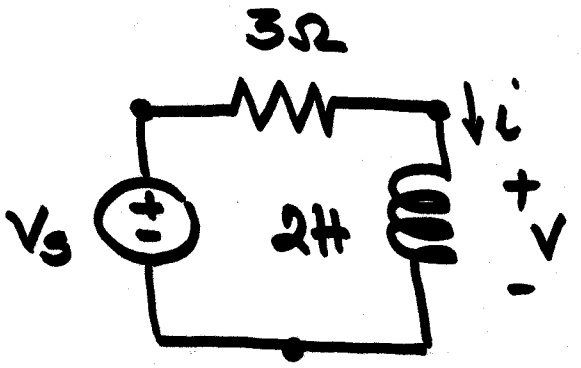

30Ω
15Ω
5Ω
60V
x
10A
Rx
5Ω
y

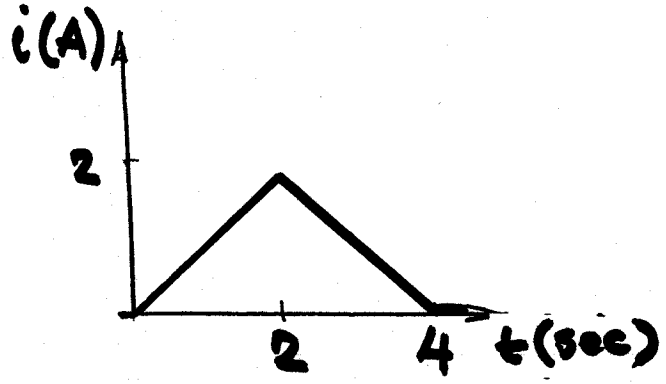
3.


10Ω
10V
10Ω
1V


id(mA)
0.8
0.4
2
4
Vd(V)

4(a)





4(b)