# EECS 42 – Introduction to Electronics for Computer Science

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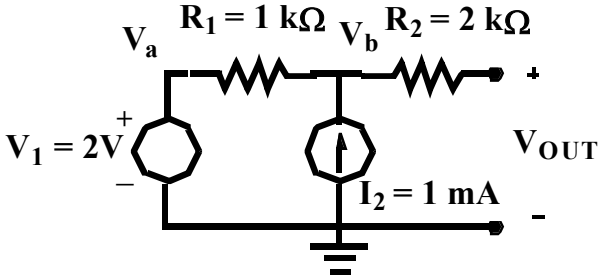
## Quiz #1 September 26, 2001

**Show your work so that the method can be graded for correctness and completeness and all of the points do not depend on just the final numerical value.**

### I (20 Points) Basic Circuit Analysis

a) For the circuit shown find $V_b$.



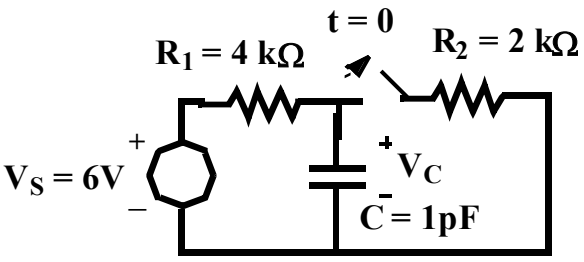

No current in the output. $I_2$ goes through $R_1$.
$V_b = V_1 + I_2R_1 = 2V + (1mA)(1\ k\Omega)$
$= 2V + 1V = 3V$

b) Find the Thevenin resistance seen looking into the output terminals.

Turn V1 to zero = short; Turn $I_2$ to zero = open
See R2 in series with R1
$R_{THEVENIN} = R_1 + R_2 = 3\ k\Omega$

### II (20 Points) Transient Analysis

The switch in the circuit to the right is opened at t = 0. Find and equation that describes $V_C(t)$.




$V_C(t) = A + Be^{-t/\tau}$
$V_C(0)$ = Voltage Divider = $V_S\ (R_2/(R_1+R_2))$
$= 6\ (2k\Omega/(4k\Omega+2k\Omega)) = 2V = A + B$
$V_C(\text{infinity}) = V_S = 6V = A$
Time constant $\tau = R_1C = 4k\Omega\ 1pF = 4$ ns

$$V_C(t) = 6V - 4e^{-t/4ns}$$