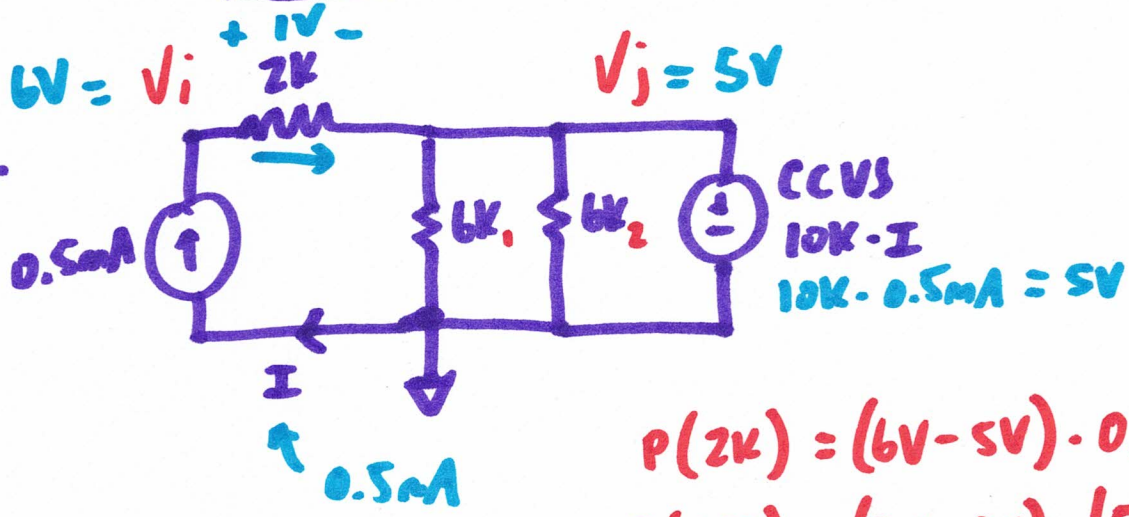
EE 220: Circuits I

HW10.1B



$P(2K) = (6V - 5V) \cdot 0.5mA = 0.5mW$

$P(6K_1) = (5V - 0V) \cdot \left(\frac{5V - 0V}{6K}\right) = 4.16mW$

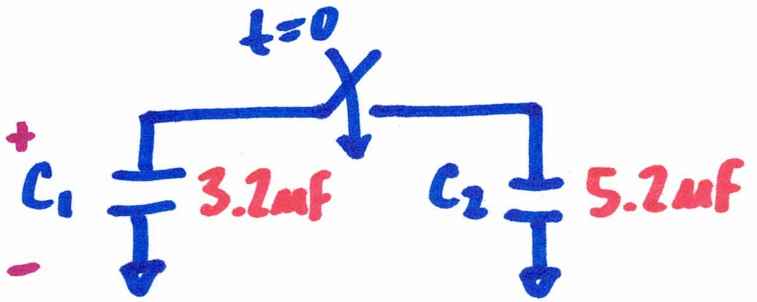
$P(6K_2) = P(6K_1) = 4.16mW$

$P_{TOT} = 8.82mW$

Charge sharing

initial conditions

$V(C_1,i) = 2V$
$V(C_2,i) = 1V$



$Q = C \cdot V$

$Q(C_1) = 2V \cdot 3.2\mu F = 6.4\mu C$
$Q(C_2) = 1V \cdot 5.2\mu F = 5.2\mu C$
} $11.6\mu C$

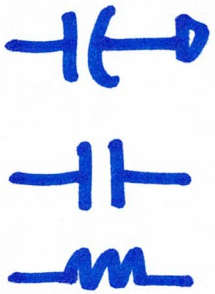
* conservation of charge

- total charge stored before sw closes = total charge stored after the switch closes.

$(2V \cdot 3.2\mu F) + (1V \cdot 5.2\mu F) = (Vf \cdot 8.4\mu F)$

$\frac{11.6\mu C}{8.4\mu F} = \frac{Vf \cdot 8.4\mu F}{8.4\mu F}$

$Vf = 1.38V$ ✓



(v) $V = \frac{Q\ (C)}{C\ (F)}$

$E = \frac{1}{2} C \cdot V^2$ ← 1.38V
↑ 8.4μF

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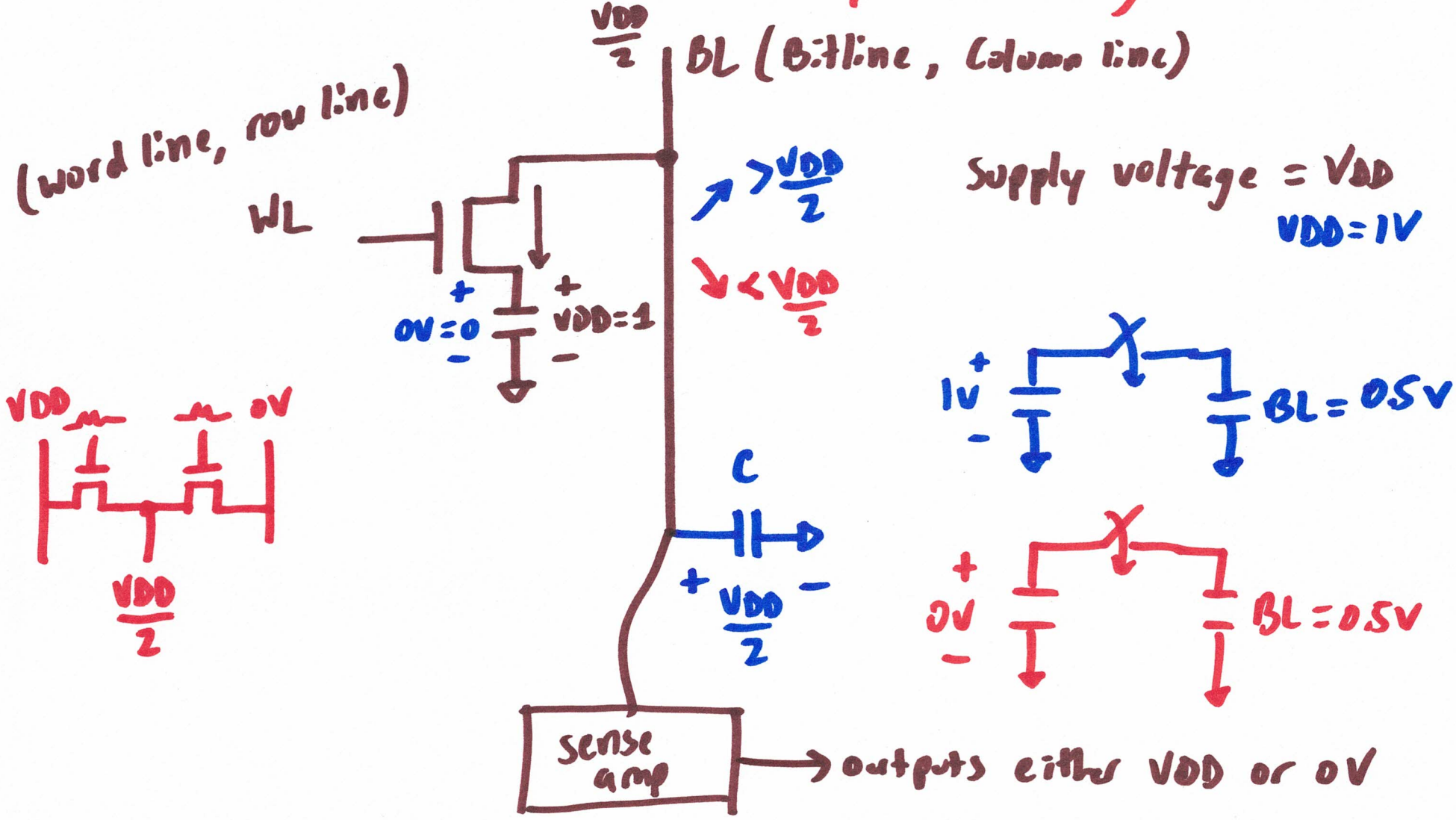
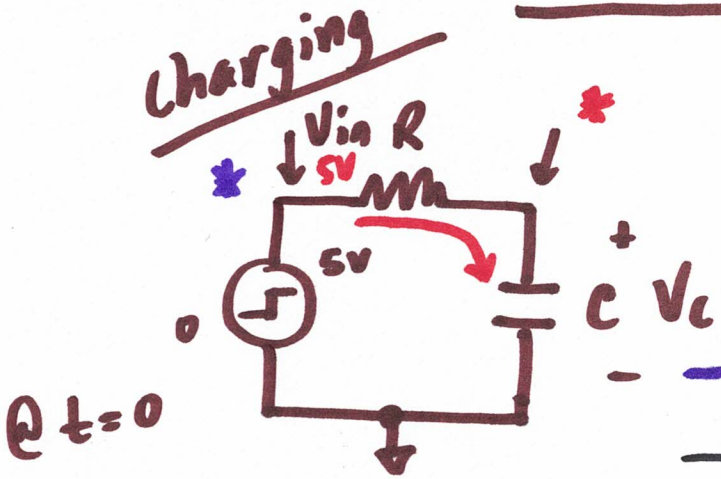
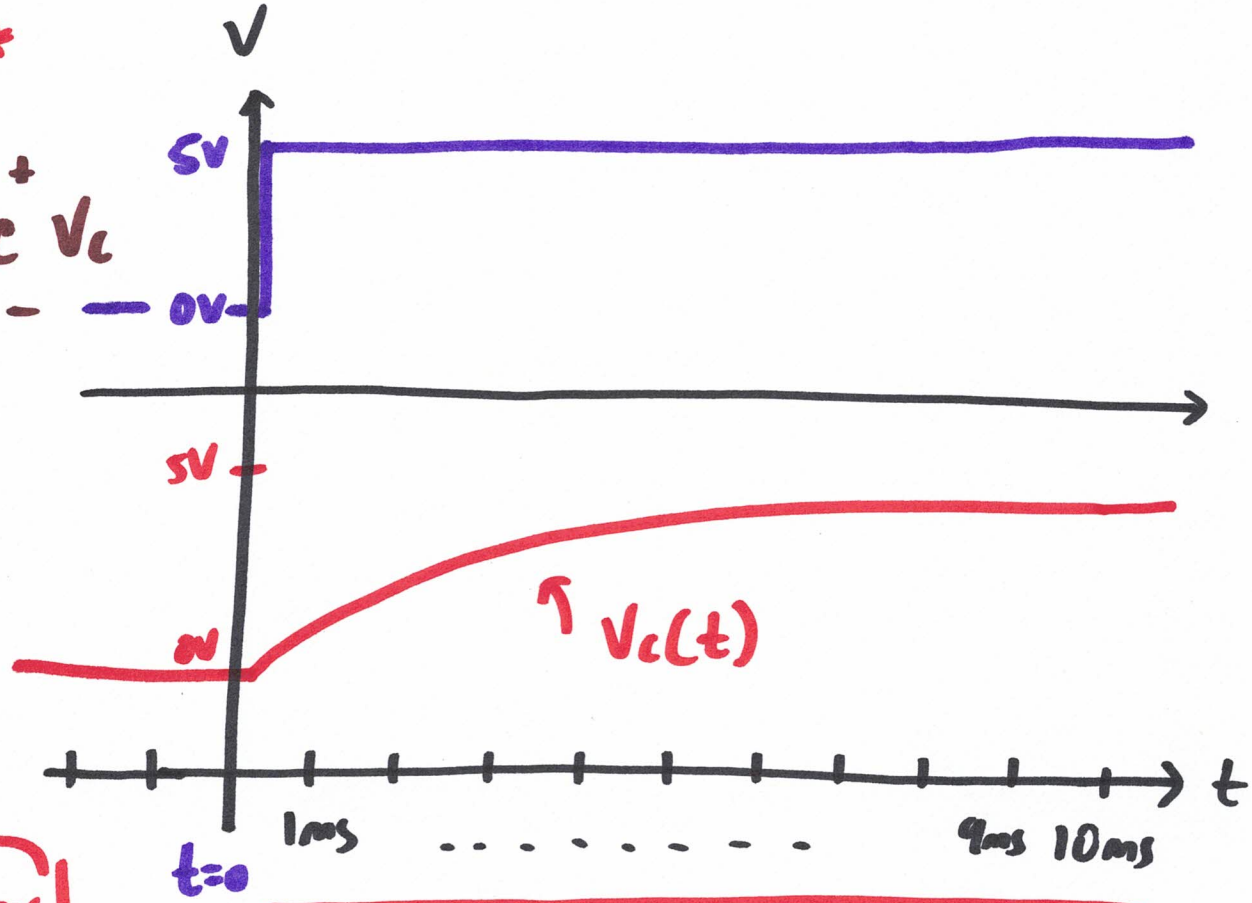
Charge sharing in memory (DRAM)



intro to RC circuits





$\tau \cong 2ms$

$C = 1uF$

$R = 2K\Omega$

$L \cdot C = 2K \cdot 1u = 2ms$

* takes ≈ 5 time constants to charge to 99%.

time constant $\tau = R \cdot C$

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