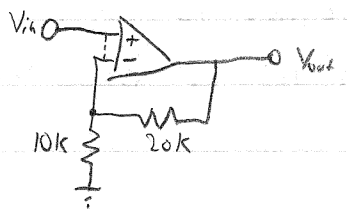
Chris
Bero

HW #2

CPE 381

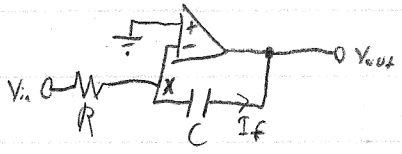
1.



$i(t) =$

$\frac{V_{out}}{V_{in}} = 1 + R_2/R_1 = 1 + 20k/10k = 1 + 2 = 3$

$V_{out} = 3\,V_{in}$



Transfer Function: F: $\frac{V_{out}}{V_{in}}$

$i(t) = \frac{V_{in} - 0}{R}$ $\quad V_c(t) = \frac{1}{C}\int_0^t i(\tau)\,d\tau$

$V_c = Q/C = Vx - V_{out} = -V_{out}$

$I_{in} = \frac{V_{in}-0}{R_{in}} = \frac{V_{in}}{R_{in}} = \frac{dV_{out} \cdot C}{dt} = I_f$

$\frac{V_{out}}{V_{in}} = -\int_0^t \frac{dt}{R_{in} \cdot C}$

3. $d(t) = (1/\tau)\, e^{-t/\tau}\, u(t)$ $\quad u(t) = \begin{cases} 1 & t > 0 \\ 0 & t < 0 \end{cases}$

4. $\frac{V_{out}}{V_{in}} = -\int_0^t \frac{dt}{R \cdot C}$

6. The lower limit of the integral is 0^-.
Used for solving D.E. with initial conditions.

7. $f_1(t) = \sin(t)\{u(t) - u(t-\pi)\}$

$$\mathcal{L}[f_1(t)] = \mathcal{L}[\sin(t)\cdot u(t)] + \mathcal{L}[\sin(t-\pi)\cdot u(t-\pi)]$$

$$= \frac{1}{s^2+1} + \frac{e^{-\pi s}}{s^2+1} = \frac{1+e^{-\pi s}}{s^2+1}$$