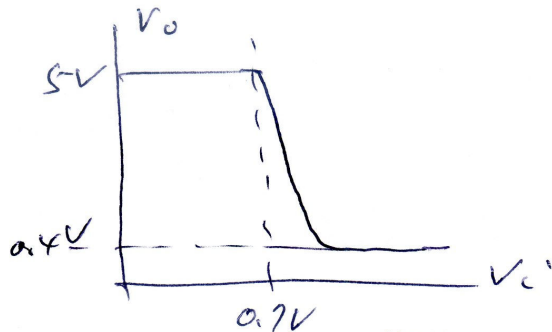


ECE 102 (Spring 2014) Solution

- #1.
- $BW = 11 \times 10^5 \times \frac{10k}{10k + 100k} = 100 \text{ kHz}$
 - $PM = 90^\circ - \tan^{-1} \frac{100k}{10M} \approx 90^\circ$
 - $v_o(t) \approx -7 \times \sin \{ 2\pi (100 \text{ kHz}) t - 45^\circ \}$
 - $BW = \frac{1}{2\pi \times 100k \times 160pF} \approx 10 \text{ kHz}$
 - $v_o(t) \approx -0.7 \times \sin \{ 2\pi (100 \text{ kHz}) t - 90^\circ \}$

#2 1.



- $I_{C1} = 1 \text{ mA} + \frac{1.5V}{1k\Omega} = 2.5 \text{ mA}, g_{m1} = \frac{2.5 \text{ mA}}{25 \text{ mV}} = \frac{1}{10\Omega}$
- $\text{Gain} = -\frac{1k\Omega}{10\Omega} = -100$
- $BW = \frac{1}{2\pi \times 1k\Omega \times 16pF} \approx 10 \text{ MHz}$
- $I_{E1} \approx 1 \text{ mA} + \frac{4.6}{1k\Omega} = 5.6 \text{ mA}$
- $r_c = \frac{\beta}{g_m} = 100 \times 10\Omega = 1k\Omega$