

#1

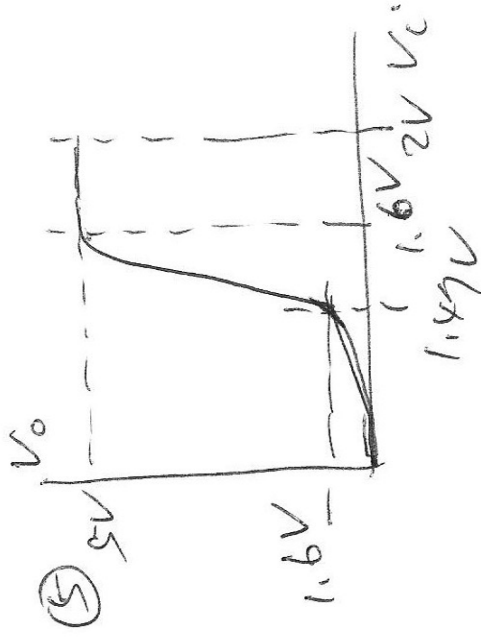
$$\textcircled{1} 200\mu A = \frac{\mu_{cox} w}{2} \frac{V_{GS} - V_{th}}{L} \quad V_{GS} \approx 0.5V$$

$$\textcircled{2} \frac{V_o}{V_i} = \mu_{cox} \frac{w}{L} (V_{GS} - V_{th}) \times 10k\Omega \approx 40$$

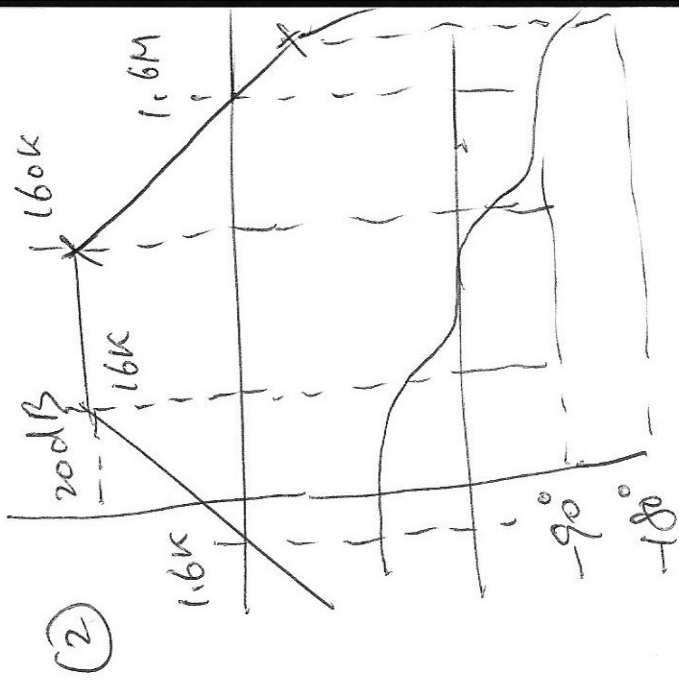
$$\textcircled{3} f_{-3dB} = \frac{1}{2\pi \times 10k \times 1pF} \approx 16MHz$$

$$\textcircled{4} 340\mu A = \frac{\mu_{cox} w}{2} (2 - V_i - 0.4)^2$$

$$V_i = 1.6 - \sqrt{\frac{1.7}{100}} \approx 1.47V$$



Gain



#2

$$\textcircled{1} \frac{1}{2\pi R_2 C_1} \approx 1.6MHz$$

$$\frac{1}{2\pi R_1 C_2} \approx 1.6MHz$$

$$\frac{V_o}{V_i} = - \frac{1/R_2 + j\omega C_2}{R_1 + \frac{1}{j\omega C_1}} = - \frac{j\omega R_2 C_1}{(1 + j\omega R_2 C_2)(1 + j\omega R_1 C_1)}$$

$$\textcircled{2} v_s(t) = -10 \sin\{2\pi(50kHz)t\}$$

$$\textcircled{4} \sim 10MHz$$

$$\textcircled{5} \sim \frac{10MHz}{10} \approx 1MHz$$