

名列番号

名前 秋田 純一

1. (1) 仮起電圧 = 0 + 1

$$V_1 - \frac{R_4}{R_3 + R_4} V_2 = \frac{R_4}{R_3 + R_4} V_2 - V_0$$

$$\frac{V_1}{R_1} = \frac{R_4}{R_3 + R_4} V_2 - \frac{R_4}{R_3 + R_4} V_2 + V_0$$

$$\rightarrow V_0 = \frac{R_4 (R_1 + R_2)}{R_1 (R_3 + R_4)} V_2 - \frac{R_2}{R_1} V_1$$

結果のみ → \triangle
仮定. 電圧不明 → \triangle \triangle

1. (2) $V_1 = V_{CM} - \frac{V_D}{2}$, $V_2 = V_{CM} + \frac{V_D}{2}$ (1) に代入

$$V_0 = \left\{ \frac{R_4 (R_1 + R_2)}{R_1 (R_3 + R_4)} - \frac{R_2}{R_1} \right\} V_{CM}$$

$$+ \frac{1}{2} \left\{ \frac{R_2}{R_1} + \frac{R_4 (R_1 + R_2)}{R_1 (R_3 + R_4)} \right\} V_D$$

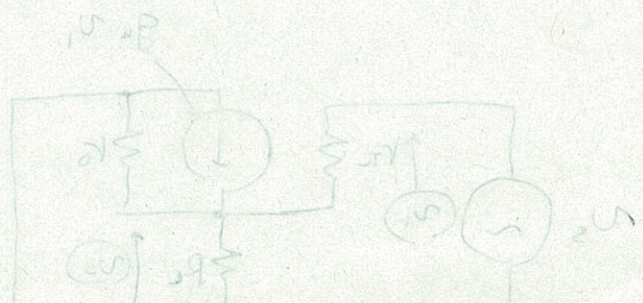
$$\therefore A_{CM} = \frac{R_4 (R_1 + R_2)}{R_1 (R_3 + R_4)} - \frac{R_2}{R_1} \quad \triangle$$

$$A_D = \frac{1}{2} \left(\frac{R_2}{R_1} + \frac{R_4 (R_1 + R_2)}{R_1 (R_3 + R_4)} \right) \quad \triangle$$

1. (4) $R_1 = R_3 = R$, $R_2 = R_4 = r$ と代入

$$\begin{cases} A_{CM} = 0 \\ A_D = \frac{r}{R} \end{cases}$$

$$\therefore CMRR = \frac{\frac{r}{R}}{0} = \infty$$



2. (1) $A_{DC} = 200,000$
dB 表記

$$20 \log_{10}(200000) = 20 \log_{10}(2 \times 10^5)$$

$$= 20 \log_{10} 2 + 20 \times 5$$

$$= 106 \text{ dB}$$

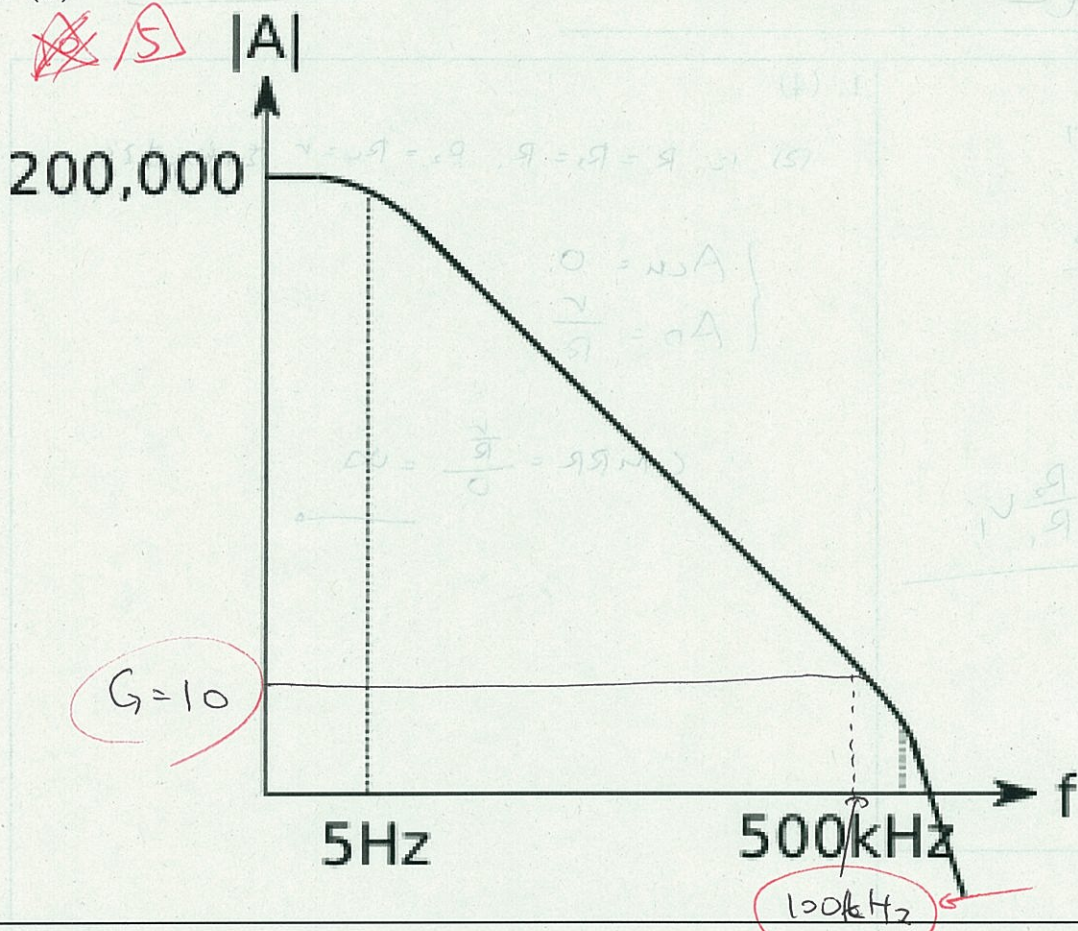
1. (3) $R_1 = R_3 = R$, $R_2 = R_4 = r$ と代入

$$V_0 = \frac{r}{R} V_2 - \frac{r}{R} V_1 = \frac{r}{R} (V_2 - V_1)$$

2. (2) $\omega = 2\pi f$

$$\begin{cases} f_1 = 5 \text{ Hz} \\ f_2 = 5006 \text{ Hz} \end{cases}$$

2. (3)

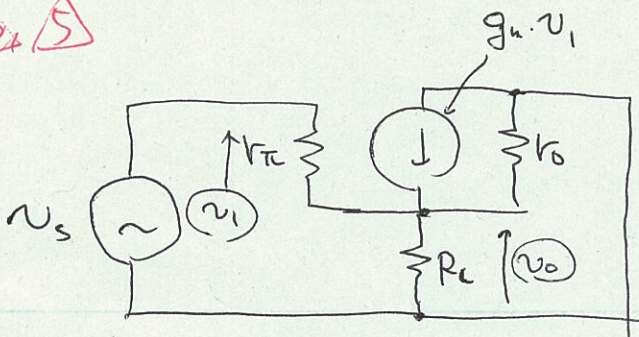


$GB積 = 200000 \times 5 = 10^6$

$G=10 \text{ 交点17. } f = 10^5 = 100kHz$

$= \omega \tau \rightarrow \Delta$

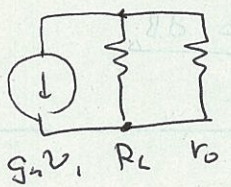
3. (1)



v_1 の定義から $\rightarrow \Delta$

4. (2)

$v_1 = v_s - v_o$



$v_o = g_m v_1 (R_L // r_o)$

$v_o = g_m (R_L // r_o) (v_s - v_o)$

$v_o (1 + g_m (R_L // r_o)) = g_m (R_L // r_o) v_s$

$\therefore \frac{v_o}{v_s} = Av = \frac{g_m (R_L // r_o)}{1 + g_m (R_L // r_o)}$

4.3 (3)

$R_C = 10k\Omega, I_C = 2mA, h_{FE} = 200, V_A = 200V$

$V_T = 25mV$

$g_m = \frac{I_C}{V_T} = \frac{2}{25} = 0.08 [S] (= 80 [mA/V])$

$r_{\pi} = \frac{h_{FE}}{g_m} = \frac{200}{0.08} = 200 \times \frac{25}{2} = 2500 [\Omega]$

$r_o = \frac{V_A}{I_C} = \frac{200}{25 \times 10^{-3} \times 0.08} = 100 [k\Omega]$

$R_L // r_o = 10k\Omega // 100k\Omega \approx 10k\Omega$

$g_m (R_L // r_o) = 0.08 \times 10^4 = 800 \therefore Av \approx 1$

8.4

基本回路は 10