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YE

$$g_{m7} = \sqrt{2 \cdot 40 \mu \cdot \frac{14}{0.7} \cdot 0.2 \text{ m}} = 5,65 \cdot 10^{-4} \text{ S}$$

$$g_{m1} = \sqrt{2 \cdot 40 \mu \cdot \frac{28}{0.7} \cdot 0.1 \text{ m}} = 5,65 \cdot 10^{-4} \text{ S}$$

$$g_{m2} = g_{m1}$$

$$g_{m3} = g_{m4} = \sqrt{2 \cdot 80 \mu \cdot \frac{7}{0.7} \cdot 0.1 \text{ m}} = 4 \cdot 10^{-4} \text{ S}$$

1) $V_{in2} = 0$

$$A_{d11} = \frac{V_{o1}}{V_{in1}} = \frac{V_{d5}}{V_{g5}} \cdot \frac{V_{d2}}{V_{g2}} \cdot \frac{V_{s1}}{V_{g1}}$$

$$r_{d17} = r_{d17} = 200 \text{ k}\Omega$$

$$r_{d11} = r_{d11} + g_{m1} \cdot r_{d17} \cdot r_{d11} + r_{d17}$$

$$r_{d11} = 400 \text{ k}\Omega$$

$$r_{d19} =$$

$$A_{d21} = \frac{V_{o2}}{V_{in1}} = \frac{V_{d6}}{V_{g6}} \cdot \frac{V_{d1}}{V_{g1}}$$

$$\frac{V_{s1}}{V_{g1}} \approx \frac{g_{m1} \cdot r_{d17}}{1 + g_{m1} \cdot r_{d17}}$$

$$\frac{V_{d5}}{V_{g5}} \approx -g_{m5} \cdot r_{d18}$$

$$\frac{V_{d2}}{V_{g2}} \approx g_{m2} \cdot \frac{1}{g_{m3}}$$

$$\frac{V_{o1}}{V_{in1}} \approx \frac{g_{m1} \cdot r_{d17}}{1 + g_{m1} \cdot r_{d17}} \cdot (-g_{m5} \cdot r_{d18}) \cdot \left(\frac{g_{m2}}{g_{m3}} \right)$$

$$\frac{V_{d1}}{V_{g1}} \approx \frac{g_{m1} \cdot \frac{1}{g_{m3}}}{1 + g_{m1} \cdot r_{d19}}$$

$$\frac{V_{d6}}{V_{g6}} = -g_{m6} \cdot r_{d19}$$

$$A_{d21} = \frac{V_{o2}}{V_{in1}} = - \frac{g_{m1} \cdot \frac{1}{g_{m3}}}{1 + g_{m1} \cdot r_{d19}} \cdot (-g_{m6} \cdot r_{d19})$$

$$0,012$$

$$\underline{V_{in1} = 0}$$

$$\frac{V_{o1}}{V_{in2}} = \frac{V_{d5}}{V_{g5}} \cdot \frac{V_{d2}}{V_{g2}} = A_{d21}$$

$$\frac{V_{o2}}{V_{in2}} = \frac{V_{d6}}{V_{g6}} \cdot \frac{V_{s1}}{V_{d1}} \cdot \frac{V_{s2}}{V_{g2}} = A_{d11}$$

$$V_{o1} = A_{d21} \cdot V_{in2} + A_{d11} \cdot V_{in1}$$

$$V_{o2} = A_{d21} \cdot V_{in1} + A_{d11} \cdot V_{in2}$$

$$V_{o2} = A_{d21} \cdot V_{in1} + A_{d11} \cdot V_{in2}$$

$$V_{o2} - V_{o1} = A_{d21} \cdot V_{in1} + A_{d11} \cdot V_{in2} - A_{d21} \cdot V_{in2} - A_{d11} \cdot V_{in1}$$

$$V_{o2} - V_{o1} = A_{d21} (V_{in1} - V_{in2}) - A_{d11} (V_{in1} - V_{in2})$$

$$\frac{V_{o2} - V_{o1}}{V_{in1} - V_{in2}} = A_{d21} - A_{d11} = g_{m5} \cdot r_{d17} \cdot \frac{g_{m2}}{g_{m3}} \cdot \left(\frac{1}{1 + g_{m1} \cdot r_{d17}} - 1 \right)$$

$$= g_{m5} \cdot r_{d17} \cdot (-1.4)$$

2)

$$3) \quad I_{D7} = \frac{k_p}{2} \cdot \frac{W}{L} \cdot (V_{GS} - V_{THP})^2 \cdot \left(1 + \frac{V_{DS}}{V_A}\right)$$

$$0,2 \text{ mA} = \frac{40}{2} \cdot 10^{-6} \cdot \frac{14}{0,7} \cdot (V_{GS} + 0,8)^2 \cdot \left(1 + \frac{V_{DS}}{40}\right)$$

$$0,5 = (V_{GS} - 3 + 0,8)^2 \cdot \left(1 + \frac{V_{DS} - 3}{40}\right)$$

$$V_{D7} = V_{S1} = V_{S2} \quad 0,1 = 0,5 =$$