1. (50 分) The following six circuits are variations of the source follower. Assume $\mu_n = 2\mu_p$, $\lambda_p = 2\lambda_n \ll 1$, the W/L ratios and bias currents are the same for all transistors, and the supply voltage (V_{DD}) are the same for all amplifiers. Please find the circuit(s) with the following characteristics:

   (a) Highest small-signal voltage gain (12 分)

   (b) Lowest-small signal voltage gain (12 分)

   (c) Highest output resistance (13 分)

   (d) Lowest output resistance (13 分)

   Please neglect bulk effect and assume that no load resistors are connected at the outputs.
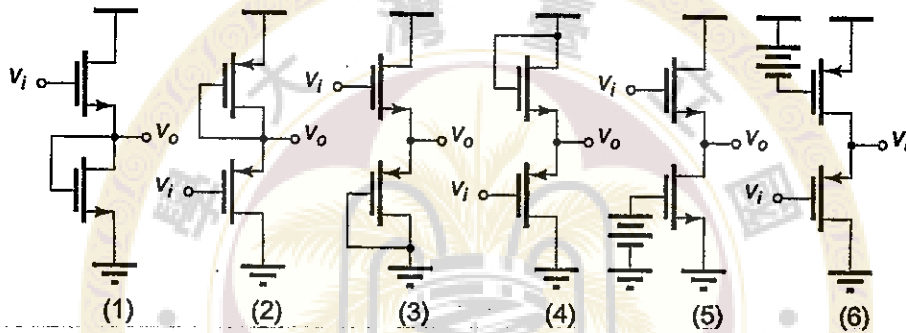
2. (50 分) Assume $\mu_n C_{ox} W/L = 1600\mu A/V^2$, $V_T = 0.5V$, and $\lambda = 0.01$ (neglect λ for (a)~(c)) for all transistors in the following circuit. Please find:

   (a) The value of R such that the output voltage ($v_{o+} - v_{o-}$) has zero DC offset (12 分)

   (b) The input common-mode range (ICMR) (12 分)

   (c) The small-signal differential gain [Hint: find gain of two differential half circuits] (13 分)

   (d) The common-mode rejection ratio (CMRR) (13 分)

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