

Let  $G$  be a pseudorandom generator where  $|G(s)| = |s| + 1$

1. Define  $G'(s) = G(s)||\bar{s}$ , where  $\bar{s}$  is the bit-wise negation of  $s$ . Is  $G'$  necessarily a pseudorandom generator?
2. Define  $G'(s) = G(s)||G(\bar{s})$ , where  $\bar{s}$  is the bit-wise negation of  $s$ . Is  $G'$  necessarily a pseudorandom generator?
3. Define  $G'(s) = G(s)_1||G(G(s)_2, \dots, G(s)_{|s|+1})$ , where  $G(s)_i$  denotes the  $i$ -th output bit of  $G(s)$ . Is  $G'$  necessarily a pseudorandom generator?