Oracles & Circuits

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Problem 1

Part 1

$L_A \in$ PSPACE because it takes 1 bit to store the parity as each of the 2^n possible strings is queried.

Part 2

Consider some ordering of NP machines where machine $M_i(1^n)$ is time bounded by $n^{f(i)}$ for some monotonic increasing f.

1. Looking at M_i, pick n large enough all prior machines could not have queried strings of length n within their time bounds.
2. Then if $M_i(1^n) = 1$ and $1^n \in L_A$, pick any accepting trace and add/remove some of the strings in A NOT queried so that $1^n \notin L_A$ while $M_i(1^n)$ is still 1.
3. If $M_i(1^n) = 0$ and $1^n \notin L_A$, add a length-n string to A to $1^n \in A$. If then $M_i(1^n)$ is still 0, then M_i disagrees with L_A on 1^n. On the other hand if $M_i(1^n)$ is now 1, perform step 2 so that again $1^n \notin A$ but $M_i(1^n)$ is still 1.

Problem 2

No attempt yet

Problem 3

No attempt yet

Problem 4

No attempt yet

Problem 5

No attempt yet