

Recall the MIN-WAIT-TIME decision problem from assignment 3. The corresponding optimization problem MIN-WAIT-TIME-OPT is:

Instance: $d : [n]^2 \mapsto \mathbb{N}$

Solution: A permutation $\sigma : [n] \mapsto [n]$

Objective: Minimize $\sum_{i=1}^n W_{\sigma}(i)$

Prove that if $\mathbf{P} \neq \mathbf{NP}$, then for every constant $\alpha \geq 1$ there is no polynomial-time α -approximation algorithm for MIN-WAIT-TIME-OPT.

Hint: Use a gap-introducing reduction from HAM-PATH.