Algorithm 1

Require: A quantum algoritm A such that $\nu(A) \geq 0$, an accuracy $\epsilon < 1/2$.
Ensure: An estimate of $\mathbb{E}[\nu(A)]$.

1: Set $k = \log_2(1/\epsilon)$, $t_0 = \frac{D\sqrt{\log_2 1/\epsilon}}{\epsilon}$, where D is a universal constant to be chosen later.
2: Use algorithm 1 with $t = t_0$, $\delta = 1/10$ to estimate $\mathbb{E}[\nu(A_{0,1}]$. Let the estimate be $\widetilde{\mu}_0$.
3: For $l = 1, \ldots, k$: Use algorithm 1 with $t = t_0$, $\delta = 1/(10k)$ to estimate $\mathbb{E}[\nu(A_{2^{l-1},2^l}/2^l]$. Let the estimate be $\widetilde{\mu}_l$.
4: Output $\widetilde{\mu} = \widetilde{\mu}_0 + \sum_{l=1}^{k} 2^l \widetilde{\mu}_l$.