Master Theorem

Back to Week 4

1/1 points earned (100%)

Quiz passed!

1 / 1 points

1.
Mark **all** the correct statements.

- [ ] If $T(n) = 3T(n/2) + O(n)$ then $T(n) = O(n)$.

Correct Response
No, $T(n) \neq O(n)$: $T(n)$ grows as $n^{\log_2 3}$. Since $\log_2 3 > 1$, $T(n)$ grows faster than just n.

- [x] If $T(n) = 8T(n/2) + O(n^2)$ then $T(n) = O(n^4)$.

Correct Response
Yes, $T(n) = O(n^4)$: from the Master theorem, we know that $T(n)$ grows no faster than $n^{\log_2 8} = n^3$. At the same time, n^3 grows slower than n^4 and hence $T(n) = O(n^3)$ and $T(n) = O(n^4)$.

- [x] If $T(n) = T(n/2) + O(1)$ then $T(n) = O(\log n)$.

Correct Response
Yes, $T(n) = O(\log n)$: this is the running time of the binary search algorithm and a recurrence relation it satisfies.