Q1

3 Points

Use a recursion tree to give an asymptotically tight solution to the recurrence

T (n) = T (n - a) + T (a) + cn, where $a \geq 1$ and $c > 0$ are constants.

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1 / 1

Q2 True / False

4 Points

Determine whether the following statements are True or False.

Q2.1

1 Point

if $f(n) = n^3 + 2n^2 + 3n + 4$, then $f(n) = O(n^3)$

- (selected) `True`
- `False`

Q2.2

1 Point

The binary-search recurrence:
$T(n) = T(n/2 + \Theta(1)$, resolves to $T(n) = \Theta(logn)$

- (selected) `True`
- `False`

Q2.3

1 Point

Using the master method, $T(n) = 9T(n/3) + n$, resolves to $T(n) = \Theta(n^2)$

- (selected) `True`
- `False`

Q2.4

1 Point

We can use master method to solve the following recurrence:
$T(n) = 2T(n/2) + nlogn$

- [ ] `True`
- [x] `False`

Q3

3 Points

Can the master method be applied to the recurrence $T(n) = 4T(n^2) + n^2 logn$

Why or why not? Give an asymptotic upper bound for this recurrence.

I think the question should be T(n) = 4T(n/2) + n^2log n. With being that said, no, we can't apply. When we apply to the case 3 of master method, but we can't get any such positive constant є.

Hence, we solve this question as follows:

T(n) = 4T(n/2) + n^2log n
= 16T(n/2^2) + n^2 log n + n^2 log(n/2)
.
.
.
= 4^log n + n^2[log n + log(n/2) + ...+ log(n/2^(log n)]
= 4^log n + n^2 * log(n*2/2*... *n/2^log n)
= n^2 + n^2*log(n^log (n+1)/2^log n * (log n + 1)/2)
= n^2 + n^2*log(n^(log n + 1)/2)
= n^2 + n^2*(log n + 1)/2 * log n

So, T(n) = O(n^2log^2 n), we can assume that
T(n) <= C(n log n)^2 for some constant C.

Quiz 1 -Recurrence

GRADED

STUDENT

Kejian Tong

TOTAL POINTS

9 / 10 pts

QUESTION 1

(no title) **2** / 3 pts

QUESTION 2

True / False **4** / 4 pts

2.1 (no title) **1** / 1 pt

2.2 (no title) **1** / 1 pt

2.3 (no title) **1** / 1 pt

2.4 (no title) **1** / 1 pt

QUESTION 3

(no title) **3** / 3 pts