CT1 Examination.

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Answer No - 5

given, E = lion is eating
H = lion is hungry

a) $E \Rightarrow \neg H$

If lion is eating, then lion is not hungry.

b) $E \wedge \neg H$

Lion is eating and not hungry.

c) $\neg(H \Rightarrow \neg E)$

Lion is hungry and eating.

Answer No - 3

given Recurrence relation.

$$T(n) = 2T\left(\frac{n}{2}\right) + n - 1 \quad \text{---} (1) \qquad T(1) = 1$$

putting value of T_n again in above equation

$$T(n) = 4T\left(\frac{n}{4}\right) + 2n - 2$$

now again put value of $T(n)$ in equation 1

$$\Rightarrow \quad T(n) = 8T\left(\frac{n}{8}\right) + 3n - 3$$

let $n = 8$

$$\Rightarrow \quad T(n) = n \cdot T\left(\frac{n}{n}\right) + 3n - 3$$

$$T(n) = n.T(1) + 3(n-1)$$

$$Tn = n + 3n - 3$$

$$Tn = 4n - 3$$

therefore close form of recurrence relation is $4n - 3$.

Ans NO 1

given. C = A bird can fly.

F = A bird has wings.

now translate english sentence into propositional logics.

a) If a bird has wing, the bird can fly.

$$F \rightarrow C$$

b). if a bird has no wings, then it can't fly.

$$\neg F \rightarrow \neg C$$

Ans NO - 4

a) given ~~equation~~. Relation $T(n) = 3T\left(\frac{n}{4}\right) + cn^2$

now compare this with standard.

$$T(n) = aT\left(\frac{n}{b}\right) + f(n)$$

$a = 3, b = 4, f(n) = cn^2$

Therefore $n \log_b^a = n \log_4^3 = n^0$ $[\because \log_4^3 = 0]$

$\therefore$ $f(n) > n \log_b^a$

therefore case 3rd applied

$$T(n) = \Theta f(n)$$

$$= \Theta(cn^2)$$

b) given recurrence relation

$$T(n) = T\left(\frac{2n}{3}\right) + 1$$

compare above relation with

$$T(n) = a\,T\left(\frac{n}{b}\right) + f(n)$$

we get,

$$a = 2,\quad b = 3,\quad f(n) = 1$$

now lets $n^{\log_b a} = n^{\log_3 2} = n^0$

now $f(n) = n^{\log_b a}$

$\Rightarrow$ $T(n) = O(n^{\log_b a} \cdot \log n)$

$\Rightarrow$ $T(n) = O(n^0 \cdot \log n)$

$\Rightarrow$ $T(n) = O(\log n)$

Answer no-2

now $(p \to q) \to [(p \to q) \to q]$ is a tautology.

p	q	$p \to q$	$(p \to q) \to q$	$(p \to q) \to [(p \to q) \to q$
True	True	True	True	True
True	false	false	True	True
false	false	True	false	false
false	True	True	True	True.

if given expression is true for tautology then it should have all value true but due to there is a "false" therefore it is not a tautology.