from assumption = $T(k+1)$ =

↳ $3+3k+2$ ⇐ assumption about the closed form =)

↳ $T(k+1) = 3k+5$

↳ equal to hypothesis =)

Inductive Step Holds! $(3k+5 = 3k+5)$ =)

Basis Step Holds, IH holds, Inductive Step Holds

Qed

make that a sentence =)

Reflexive ✓ aRb $a=b$

Symmetric ✓

Antisymmetric ✓

Transitive ✓

Recurrence Relations

$$T(n) = \begin{cases} T(n-1) + 3 & n > 1 \\ 5 & n = 1 \end{cases}$$

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

$$1 \qquad T(n-1) = T(n-2) + 3$$

$$T(n) = T(n-3) + 3 + k$$

$$T(n) = T(n-2) + 6$$

$$T(n-2) = T(n-3) + 3$$

$$T(n) = T(n-3) + 9$$

$$T(n) = T(n-x) + 3x$$

General: $T(n) = T(n-x) + 3x$

$$x = n-1 \qquad \cancel{n}-(\cancel{n}+1)$$

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

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

$$= 5 + 3n - 3$$

Closed: $T(n) = 3n+2$

Conjecture: The Rec. Rel.

$$T(n) = \begin{cases} T(n-1) + 3 & n > 1 \\ 5 & n = 1 \end{cases}$$

is represented by the closed form $T(n) = 3n + 2$

proof (induction):

Base Step: $T(1) = 5$, per R relat.

$$T(1) = 3(1) + 2$$
$$= 3 + 2$$
$$= 5$$, per cf

$5 = 5$, so the Base Step holds.

Inductive Hypothesis:

If $T(n) = \begin{cases} T(n-1)+3 & n>1 \\ 5 & n=1 \end{cases}$ is equivalent to the closed form $T(n)=3n+2$, then it can be said that $T(K)=3K+2$ and $T(K+1)=3(K+1)+2$

$\hookrightarrow 3K+3+2$

$\hookrightarrow 3K+5$

Assume $T(k) = 3k+2$

Use Definition for $T(n)$ by ~~Definition~~ Recurrence Relation

$T(k+1) = 3 + T((k+1)-1)$

$\hookrightarrow T(k+1) = 3 + T(k)$