~~P2)~~

P3)

~~follow~~ terminales y vars

$\text{first}_k(\gamma) = \{ u|_k \mid \gamma \overset{*}{\Rightarrow} u \}$

$\text{follow}_k(X) = \{ w \mid S \overset{*}{\Rightarrow} \alpha X \beta$ y $w \in \text{first}_k(\beta\#) \}$

↓ solo vars

$\text{follow}_k^0(S) = \{\#\}$

$\text{follow}_k^0(X) = \emptyset$ si $X \neq S$

$\text{follow}_k^i(X) = \bigcup_{Y \to \alpha X \beta} \text{first}(\beta) \odot_k \text{follow}_k^{i-1}(Y)$

$\text{follow}_k^{*}(X) \subseteq \text{follow}_k(X)$

H.I: (más fuerte que lo que buscamos)

$\forall X \in V \ \forall i \geq 0$

$\text{follow}_k^i(X) \subseteq \text{follow}_k(X)$

CASO BASE ($i=0$)

$X = S$, $follow_k^0(S) = \{\#\}$

~~X~~

Como $S \xRightarrow{*} \alpha S \beta$ (con $\beta = \alpha = \epsilon$)

$\hookrightarrow first_k^{*}(\beta\#) = first_k^{*}(\cancel{\beta}\#) \Rightarrow \underline{C}$

$\Rightarrow$

Si $X \neq S$ $follow_k^0(X) = \emptyset$ por definición

Caso inductivo

Sup ~~Ho~~ Hipótesis para $n-1$

~~follow~~

Sea $w \in follow_k^n(X)$

$$\in \bigcup_{Y \to \alpha X \beta} first_k(\beta) \oplus_k follow_k^{n-1}(\hat{Y})$$

$\Rightarrow \exists$ ~~x~~ $\hat{Y} \to \hat{\alpha} X \hat{\beta}$ (particular)

tal que $w \in first_k(\hat{\beta}) \oplus_k follow_k^{n-1}(Y)$

$u \odot_k v = (u \cdot v)|_k$ SPDG $S \overset{*}{\Rightarrow} \hat{\alpha}' \hat{Y} \hat{\beta}'$

Caso 1: $w \in first_k(\hat{\beta})$

$S \overset{*}{\Rightarrow} \hat{\alpha}' \hat{\alpha} X \hat{\beta} \hat{\beta}'$

Entonces queremos que

$$w \in first_k(\hat{\beta} \hat{\beta}' \#)$$

Caso 1: $w \in first_k(\hat{\beta})$

$\Rightarrow \in first_k(\hat{\beta} \hat{\beta} \#)$ } pq son prefijos!

Caso 2: $w = uv$ con $u \in first_k(\hat{\beta})$
y $v \in follow_k^{n-1}(\hat{Y})$

por HI: $follow_k^{n-1}(\hat{Y}) \subseteq follow_k(\hat{Y})$

$\Rightarrow v \in first(\hat{\beta}' \#)$ por def de $follow_k(\hat{Y})$

$\downarrow$

u y v son de largo $\leq k$

$\therefore uv \in first_k(\beta \beta' \#)$ Si $\beta \overset{*}{\Rightarrow} u$ y $\beta' \# \Rightarrow v\#$ $\Rightarrow uv|_k \in$

$\Rightarrow w \in follow_k(X)$

Otro sentido

$follow_k^*(X) \subseteq follow_k^i(X)$ sobre este largo

HI: $\forall X \in V$ si $S \overset{*}{\Rightarrow} \alpha X \beta$

y $w \in first(\beta \#)$ $(w \in follow_k(X))$

$\Rightarrow w \in follow_k^i(X)$ para algun i

CASO BASE $(n=0)$

$S \overset{*}{\Rightarrow} \varepsilon S \varepsilon$ y $w \in first(\varepsilon \#) = \{\#\}$

$\Rightarrow w = \# \in first_k^0(S) \Rightarrow w \in follow_k^i(X)$

~~Caso inductivo: sup HI para n-1~~

~~Sea $X \in V$. $S \overset{n}{\Rightarrow} \alpha X \beta$~~

~~$\Rightarrow$~~

CASO BASE $(n=1)$

$S \overset{1}{\Longrightarrow} \alpha X \beta$, $w \in first_k(\beta \#)$

~~$w \in first(\beta) \oplus_k follow^0_k(S)$~~

$$first_k(\beta\#) \subseteq first_k(\beta) \oplus_k follow^0_k(S)$$

$$\subseteq \bigcup_{Y \to \alpha X \beta} first(\beta) \oplus_k follow^0_k(Y)$$

$$= follow^1_k(X)$$

CASO INDUCTIVO

Sea $X \in V$, $S \overset{n}{\Longrightarrow} \alpha X \beta$

$$\underbrace{S \overset{n-1}{\Longrightarrow} \alpha' Y \beta'}_{} \overset{1}{\Longrightarrow} \alpha' \alpha X \beta \beta'$$

Por HI $w \in first_k(\beta\beta'\#)$

$\Rightarrow$ ~~$w \in first$~~ $\subseteq first_k(\beta) \oplus_k first_k(\beta'\#)$

def follow $\subseteq first_k(\beta) \oplus_k follow^1_k(Y)$

caso inductivo $\subseteq \bigcup_{Y \to \alpha X \beta} first_k(\beta) \oplus_k follow^i_k(Y)$

para un i

$\Rightarrow \text{follow}_k^{i+1}(X)$

$\Rightarrow$ [illegible] $\in \text{follow}_k^{i}(X)$