a) $S = 0S0$

$S = 1S1$

$S = \epsilon$

$S \to 0S0 \to 01S10 \to 0105010 \to 010010$

b) $a^i b^i c^j$

$S = TE$

$T = aTb$

$T = \epsilon$

$E = E_c$

$E = \epsilon$

c) $a^i b^i c^j$

$S = ET$

$E = aE$

$E = \epsilon$

$T = aTb$

$T = \epsilon$

d) $(ab)^*$ $\quad$ $(ab)^k$

$S_1 = abS_1$ $\quad$ $S_2 = S_2 ab$

$S_1 = \epsilon$ $\quad$ $S_2 = \epsilon$

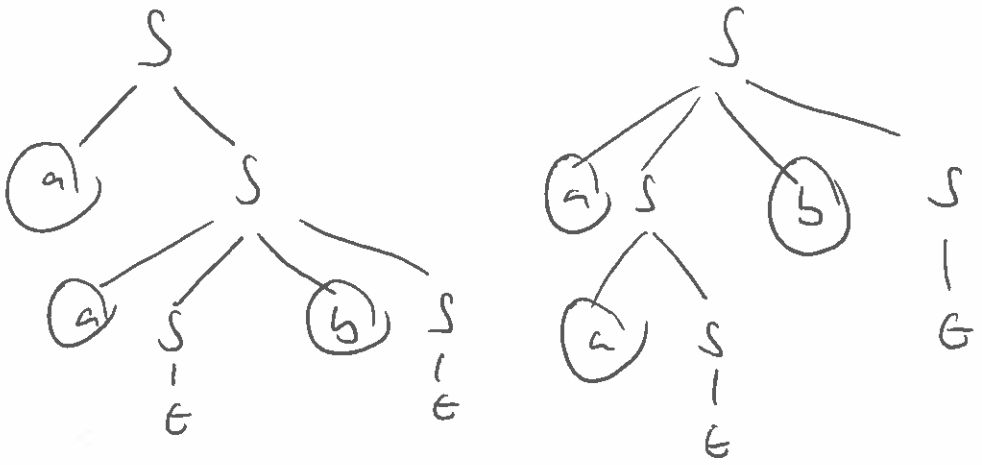
a.

$S \to aS$

$S \to aSbS$

$S \to \epsilon$

aab



b.

$S \to aS \to aaSbS \to aabS \to aab$

$S \to aSbS \to aaSbS \to aabS \to aab$

c. $S \to aS \to aaSbS \to aaSb \to aab$

$S \to aSbS \to aSb \to aaSb \to aab$

EC: ~~For condition~~,

For the transition $S \to aS$, it's clear that more As are produced than Bs.

For transition $S \to aSbS$, there is an == number of As and Bs produced.

Since at each transition, ~~there~~ we are either adding more As than Bs or keeping them equal, there will be at least as many As as Bs.