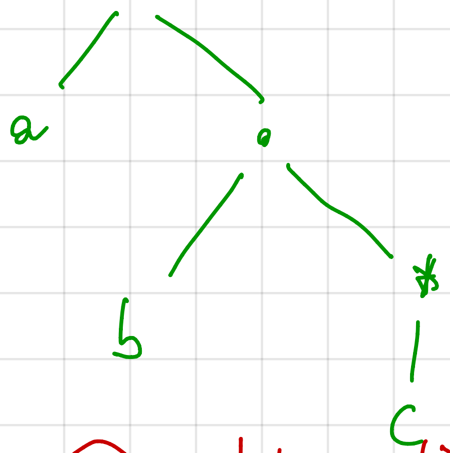
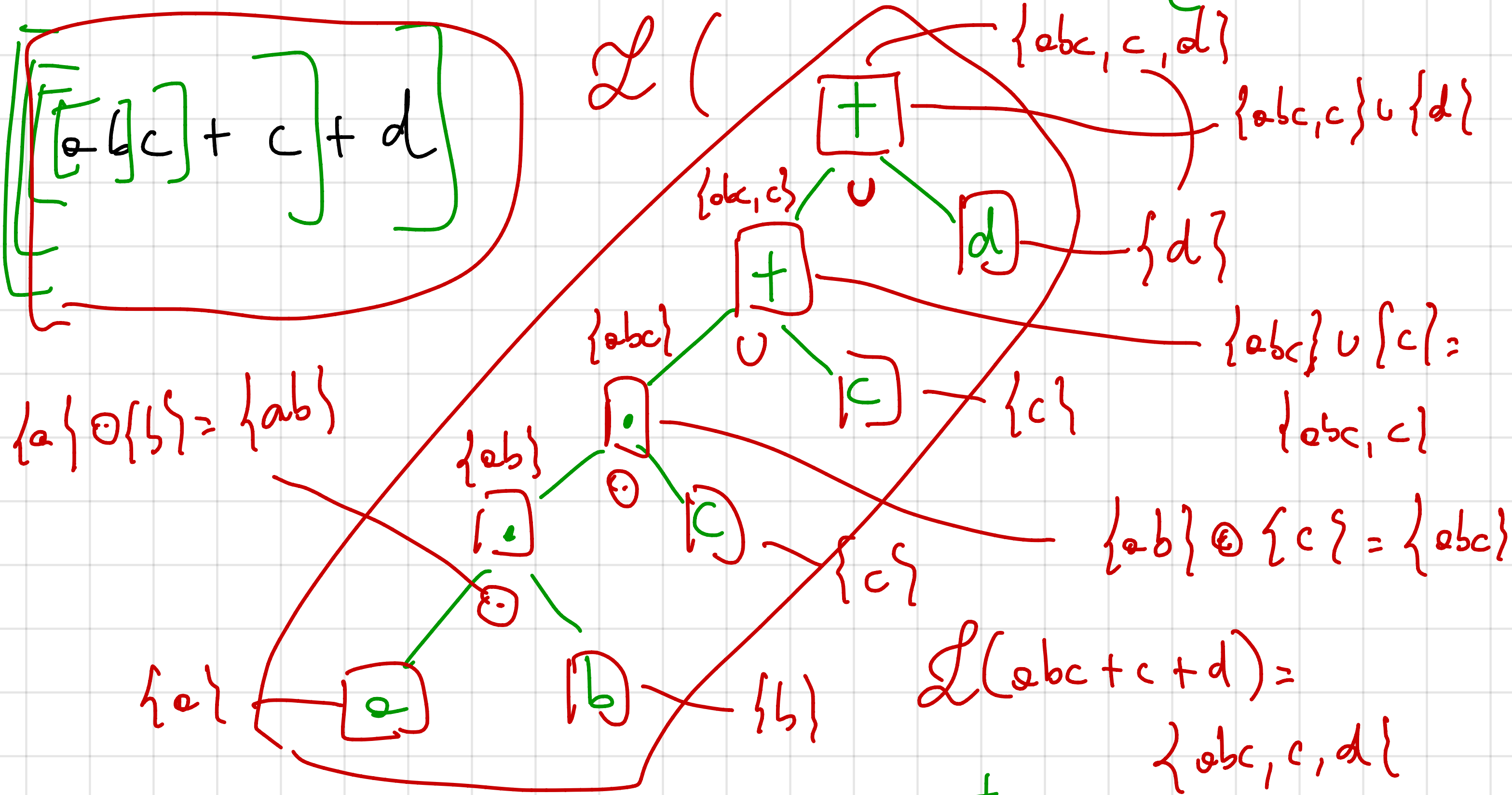
$[a + [b[c^*]]]$

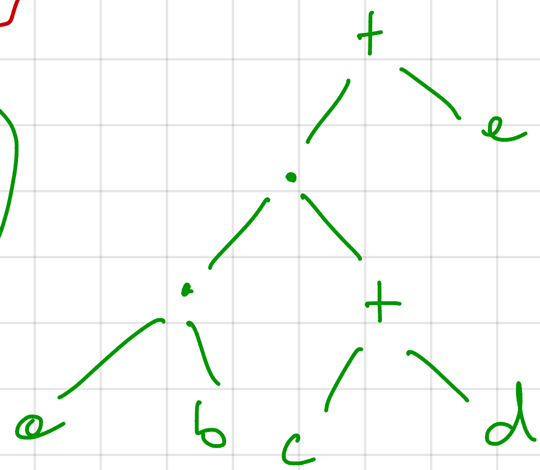
abstract syntax tree



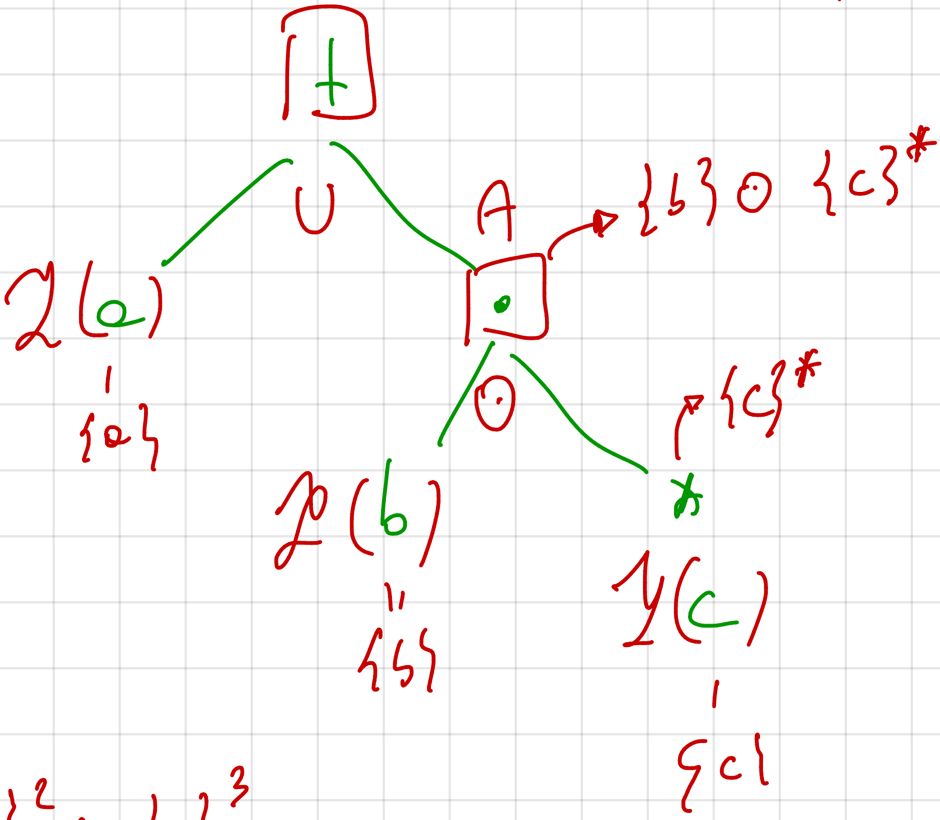
$[[[a\,b]c] + c] + d$



$[[a\,b][(c + d)]] + e$



$$\mathcal{L}(a + bc^*) = \{a\} \cup A = \{a, b, bc, bccc, bcccc, \dots\}$$



$$\{c\}^* = \bigcup_{i \geq 0} \{c\}^i =$$

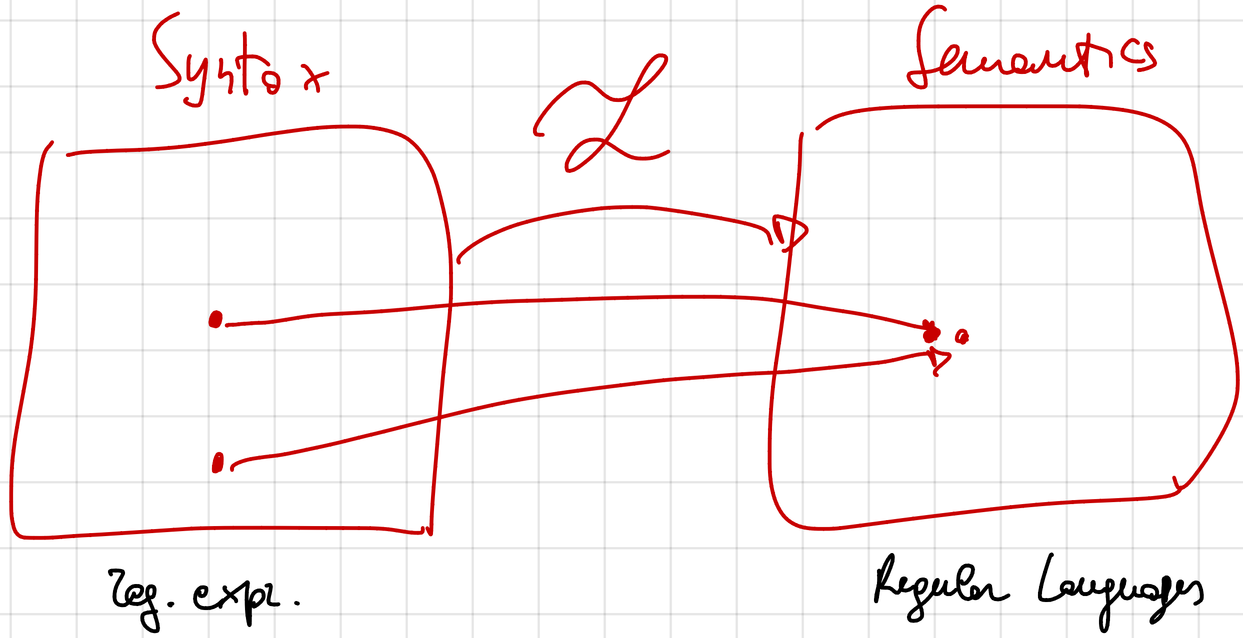
$$= \{c\}^0 \cup \{c\}^1 \cup \{c\}^2 \cup \{c\}^3 \dots$$

$$= \{\varepsilon\} \cup \{c\} \cup \{c\} \odot \{c\} \cup \{c\} \odot \{c\} \odot \{c\} \cup \dots$$

$$= \{\varepsilon, c, cc, ccc, cccc, \dots\}$$

$$\{b\} \odot \{c\}^* = \{b\} \odot \{\varepsilon, c, cc, ccc, cccc, \dots\} =$$

$$= \{b, bc, bcc, bccc, bcccc, \dots\} = A$$



$$\mathcal{L}(a+b) = \{a, b\}$$

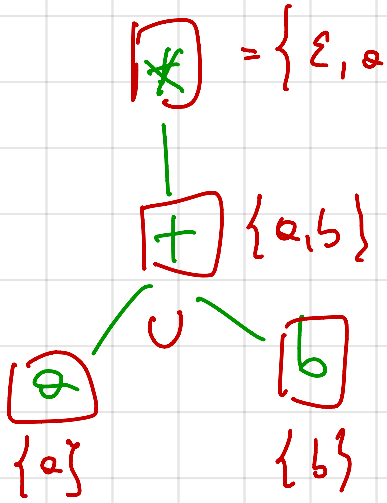
$$\mathcal{L}(b+a) = \{a, b\}$$

$$\mathcal{L}(ab^*) = \{a, ab, abb, abbb, abbbb, \ldots\}$$

$$\mathcal{L}(ab^* + ab^*) =$$

$$\mathcal{L}(\varepsilon(a+b)) = \{a, b\} = \mathcal{L}(a+b)$$

$$\mathcal{L}(\underbrace{(a+b)}^*)$$



$$= \{\varepsilon, a, b, aa, ab, ba, bb, aaa, aba, aab, abb, baa, bab, bba, bbb, \ldots\}$$

$$\{a,b\}^* = \{a,b\}^0 \cup \{a,b\}^1 \cup \{a,b\}^2 \cup \ldots$$

$$= \{\varepsilon\} \cup \{a,b\} \cup \{a,b\} \odot \{a,b\} \cup \ldots = \{\varepsilon, a, b\} \cup \{aa, ab, ba, bb\}$$

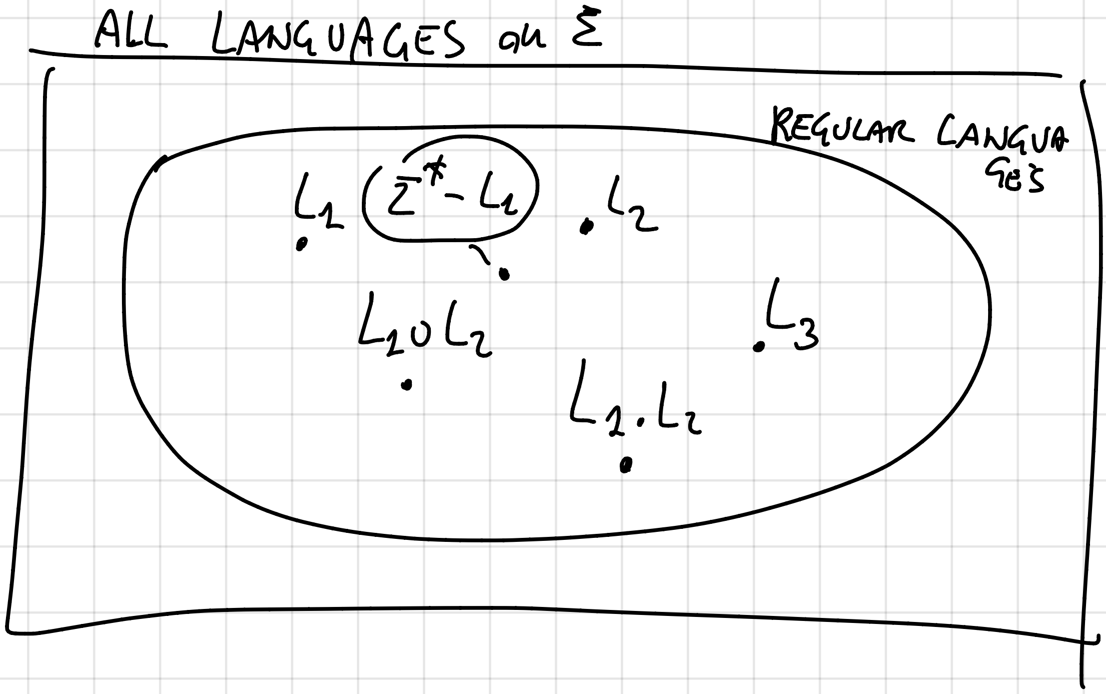
$$\mathcal{L}\left(\left((a+b)^*\right)^*\right) = \left(\{a,b\}^*\right)^*$$

$$\left(\{a,b\}^*\right)^* = \left(\{a,b\}^*\right)^0 \cup \left(\{a,b\}^*\right)^1 \cup \left(\{a,b\}^*\right)^2 \cup \dots$$

$$= \{\varepsilon\} \cup \{a,b\}^* \cup \{a,b\}^* \odot \{a,b\}^*$$

$$\{\varepsilon, a, b, aa, ab, ba, bb, \dots\} \odot \{\varepsilon, a, b, aa, ba, \dots\}$$

$$= \{\varepsilon, a, b, aa, \dots, a, aa, ab, \} = \{a,b\}^*$$



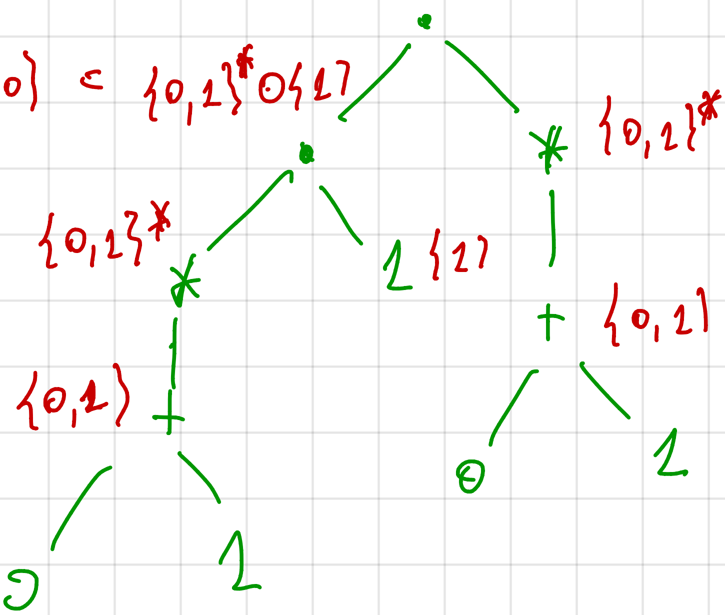
The complement of b^* where $\Sigma = \{a, b\}$

is $\{a,b\}^* - \mathcal{L}(b^*) = \{a, ab, ba, aaa, aba, aab, bab, baa, bba, \dots\}$

$\mathcal{L}((0+1)^* 1 (0+1)^*)$

$(\{0,1\}^* \setminus \{0,\varepsilon\}) \odot \{0,1\}^* = \{0,1\}^* \setminus \{0,\varepsilon\}$

$\{0,1\}^* \setminus \{\varepsilon,0\} = \{0,1\}^* \odot \{1\}$



$\{1, 01, 01, 11, \ldots\} \odot \{\varepsilon, 0, 1, 01, \ldots\}$

$= \{1, 10, 11, \ldots, \ldots\}$