

Programming Languages

Assignment 2 :-

d) $\langle \text{exp} \rangle ::= \langle \text{exp} \rangle + \langle \text{mulexp} \rangle | \langle \text{mulexp} \rangle$
 $\langle \text{mulexp} \rangle ::= \langle \text{mulexp} \rangle^* \langle \text{rootexp} \rangle | \langle \text{rootexp} \rangle$
 $\langle \text{rootexp} \rangle ::= (\langle \text{exp} \rangle) | a | b | c$

a) $\langle \text{exp} \rangle ::= \langle \text{exp} \rangle + \langle \text{mulexp} \rangle | \langle \text{exp} \rangle - \langle \text{mulexp} \rangle |$
 $\langle \text{mulexp} \rangle$

$\langle \text{mulexp} \rangle ::= \langle \text{mulexp} \rangle^* \langle \text{rootexp} \rangle | \langle \text{rootexp} \rangle |$
 $\langle \text{mulexp} \rangle / \langle \text{rootexp} \rangle$

$\langle \text{rootexp} \rangle ::= (\langle \text{exp} \rangle) | a | b | c$

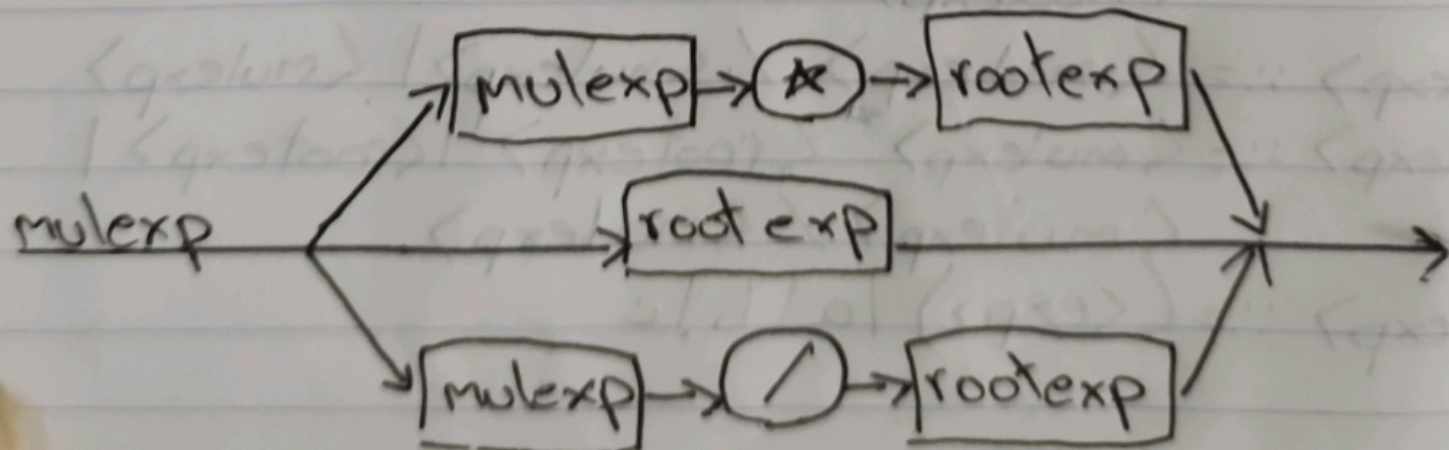
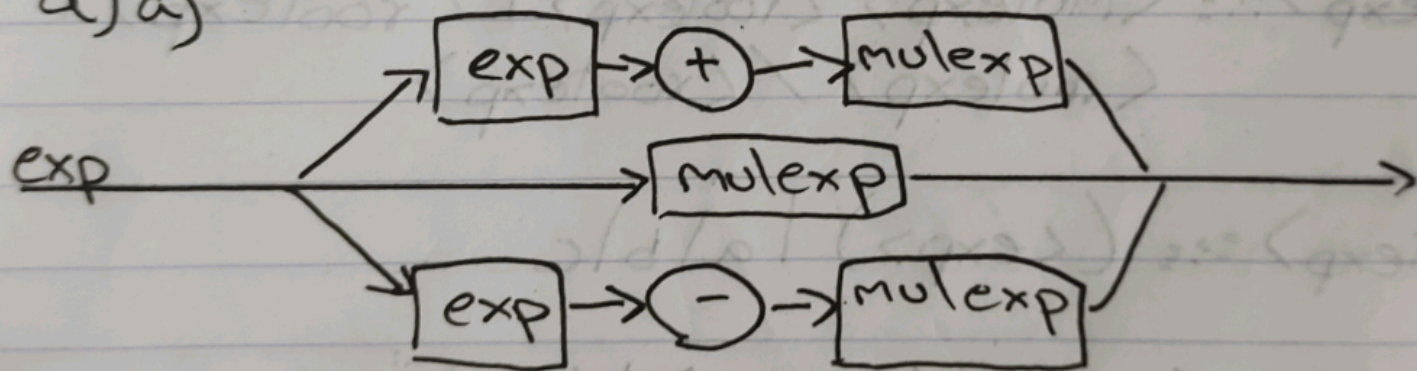
b) $\langle \text{exp} \rangle ::= \langle \text{exp} \rangle + \langle \text{modexp} \rangle | \langle \text{exp} \rangle - \langle \text{modexp} \rangle |$
 $\langle \text{modexp} \rangle$

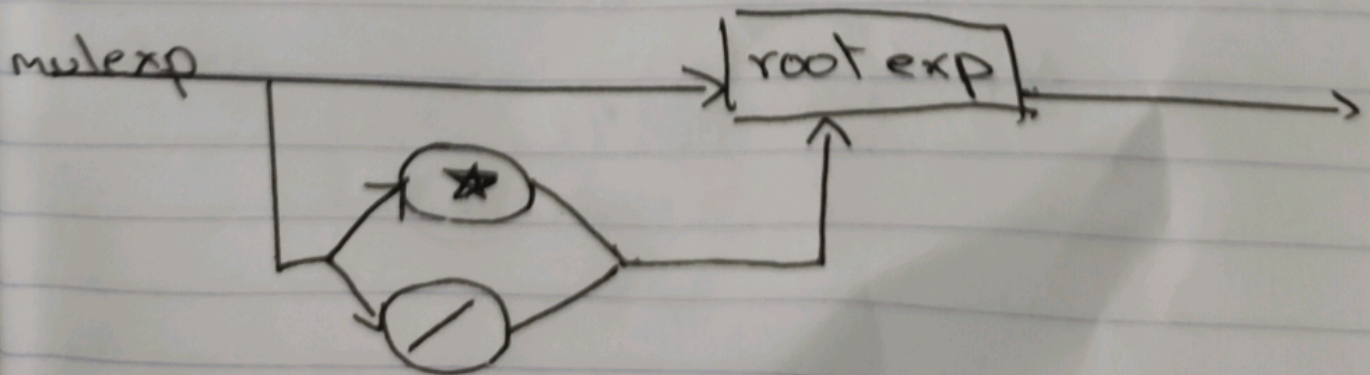
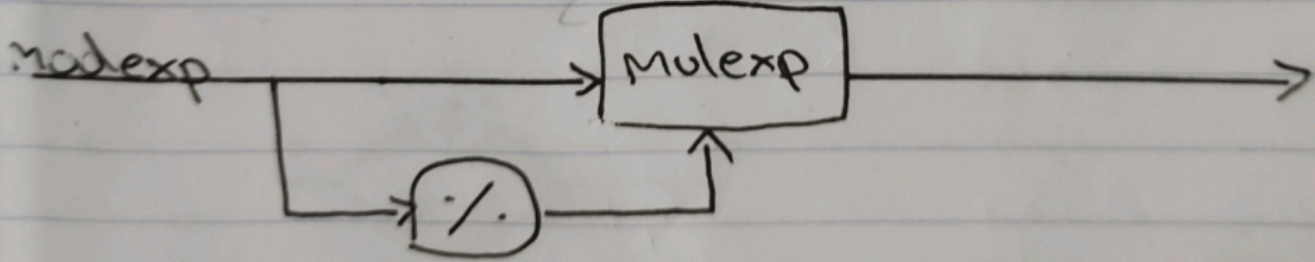
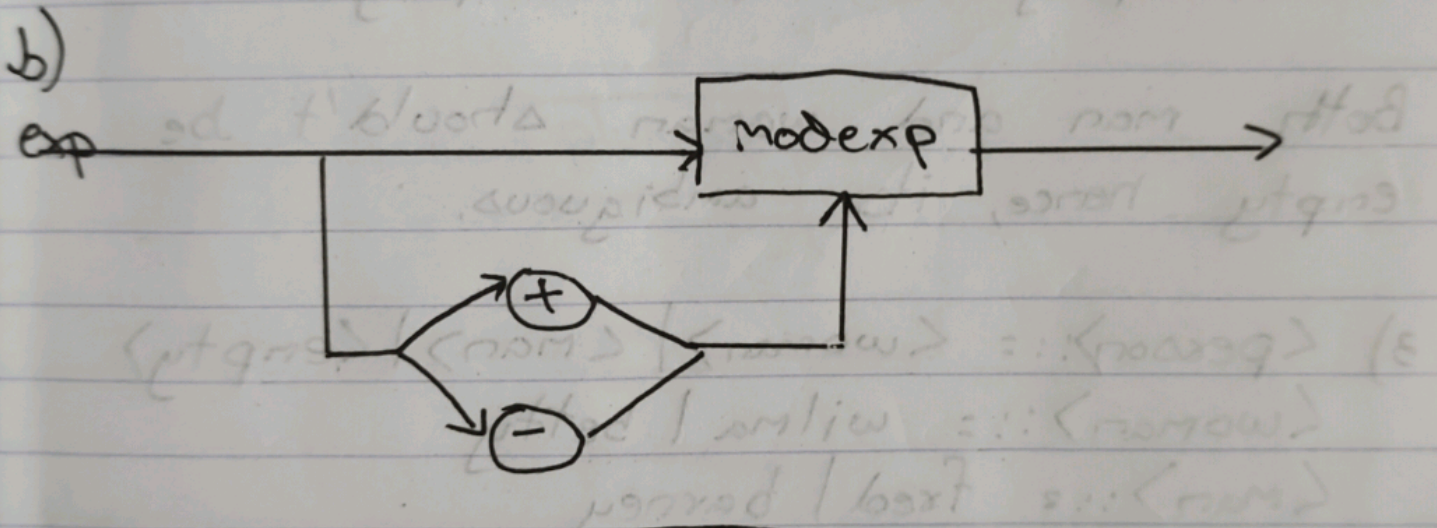
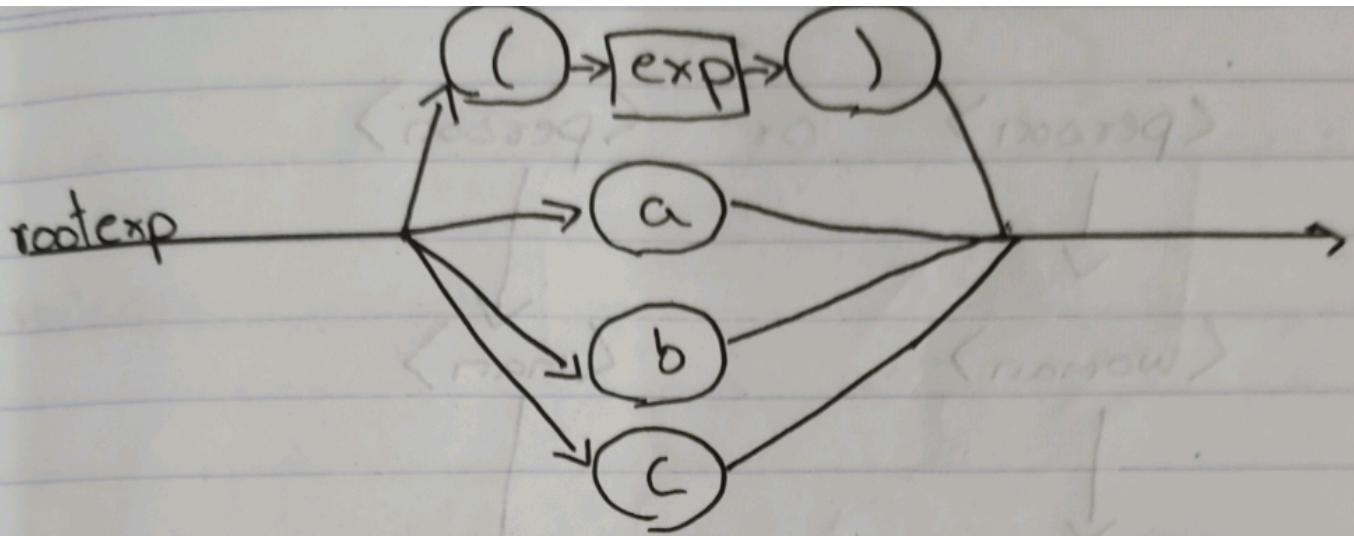
$\langle \text{modexp} \rangle ::= \langle \text{modexp} \rangle / \langle \text{mulexp} \rangle | \langle \text{mulexp} \rangle$
 $\langle \text{mulexp} \rangle ::= \langle \text{mulexp} \rangle^* \langle \text{rootexp} \rangle | \langle \text{rootexp} \rangle |$
 $\langle \text{mulexp} \rangle / \langle \text{mulexp} \rangle$

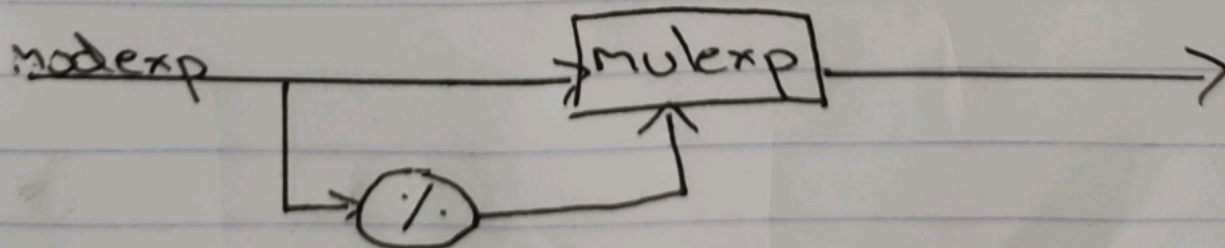
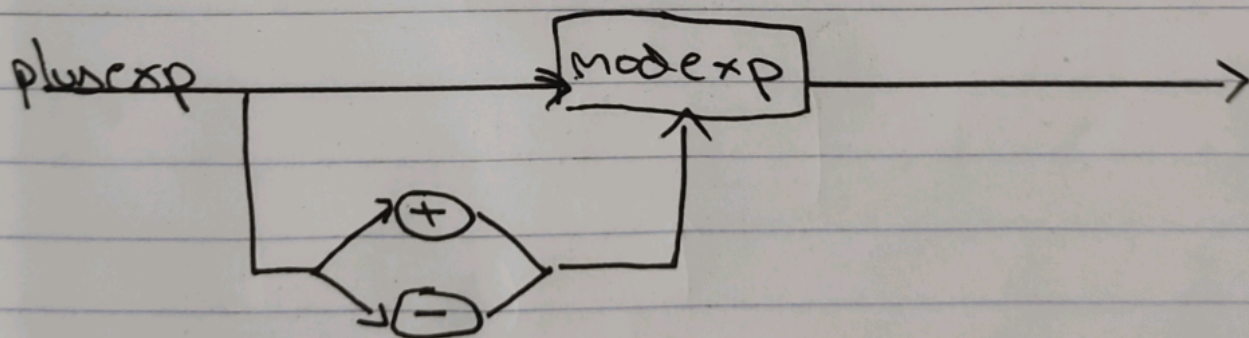
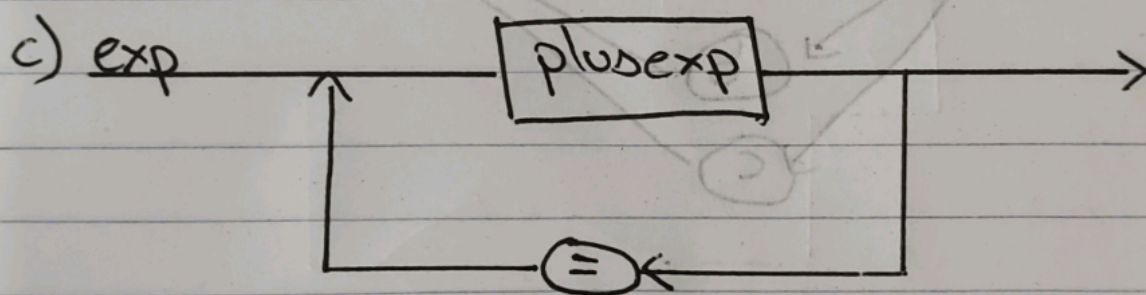
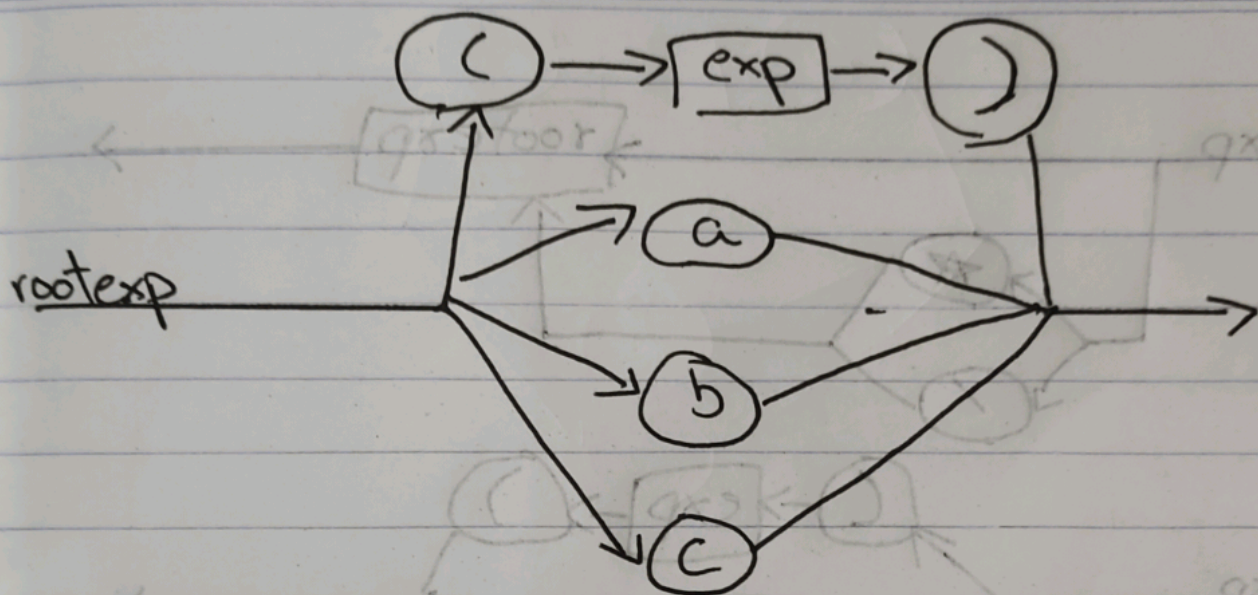
$\langle \text{rootexp} \rangle ::= (\langle \text{exp} \rangle) | a | b | c$

c) $\langle \text{exp} \rangle ::= \langle \text{plusexp} \rangle = \langle \text{exp} \rangle \mid \langle \text{plusexp} \rangle$
 $\langle \text{plusexp} \rangle ::= \langle \text{plusexp} \rangle + \langle \text{modexp} \rangle \mid \langle \text{plusexp} \rangle - \langle \text{modexp} \rangle$
 $\mid \langle \text{modexp} \rangle$
 $\langle \text{modexp} \rangle ::= \langle \text{modexp} \rangle \div \langle \text{mulexp} \rangle \mid \langle \text{mulexp} \rangle$
 $\langle \text{mulexp} \rangle ::= \langle \text{mulexp} \rangle^* \langle \text{rootexp} \rangle \mid \langle \text{mulexp} \rangle / \langle \text{rootexp} \rangle$
 $\mid \langle \text{rootexp} \rangle$
 $\langle \text{rootexp} \rangle ::= (\langle \text{exp} \rangle) \mid a \mid b \mid c$

d) a)

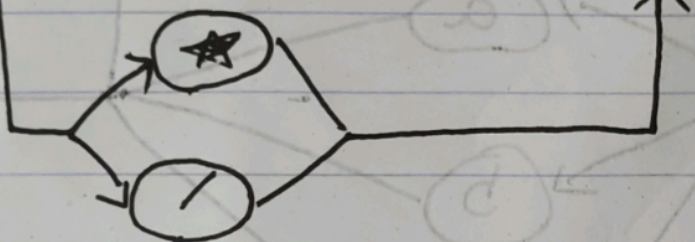




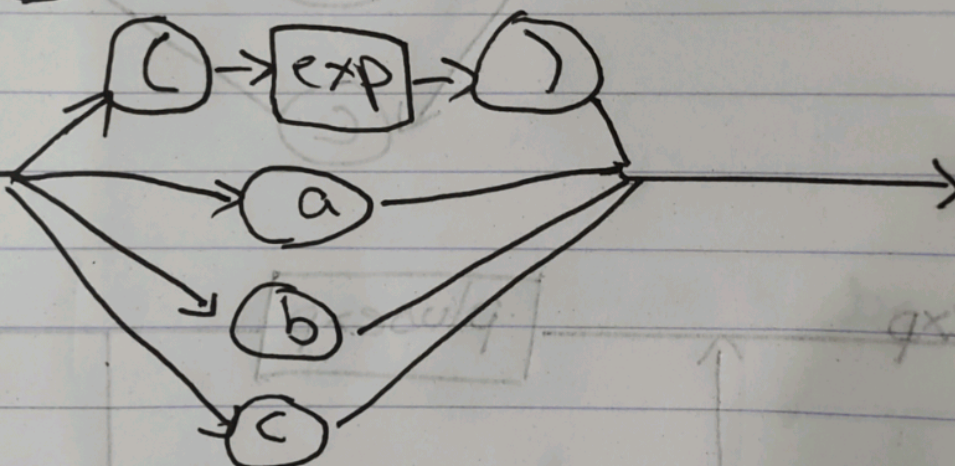


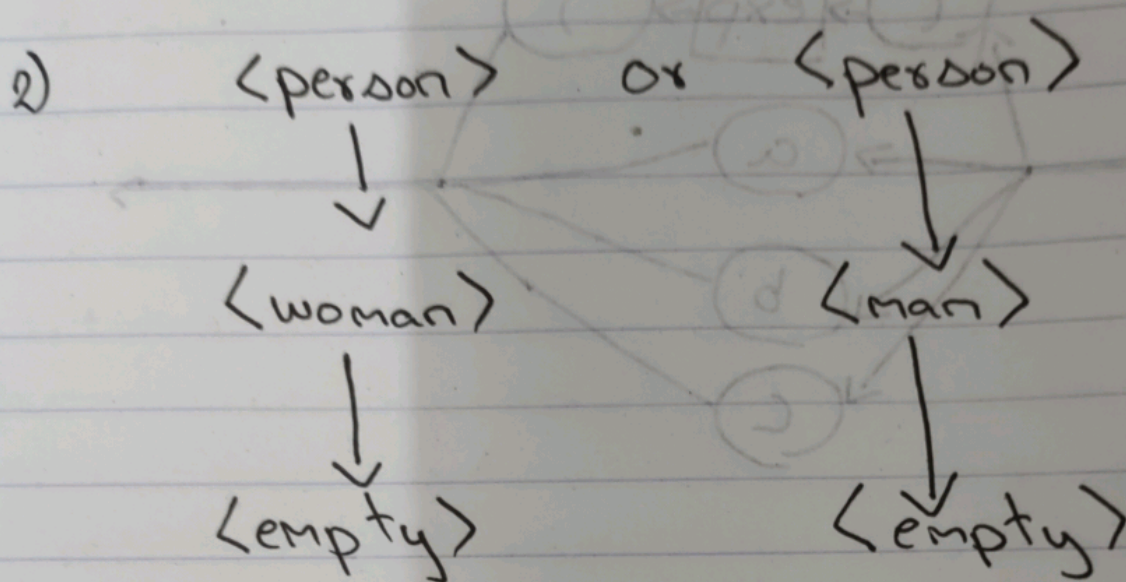
mulexp

rootexp



rootexp





Both man and woman shouldn't be empty hence, its ambiguous.

3) $\langle \text{person} \rangle ::= \langle \text{woman} \rangle \mid \langle \text{man} \rangle \mid \langle \text{empty} \rangle$
 $\langle \text{woman} \rangle ::= \text{wilma} \mid \text{betty}$
 $\langle \text{man} \rangle ::= \text{fred} \mid \text{barney}$