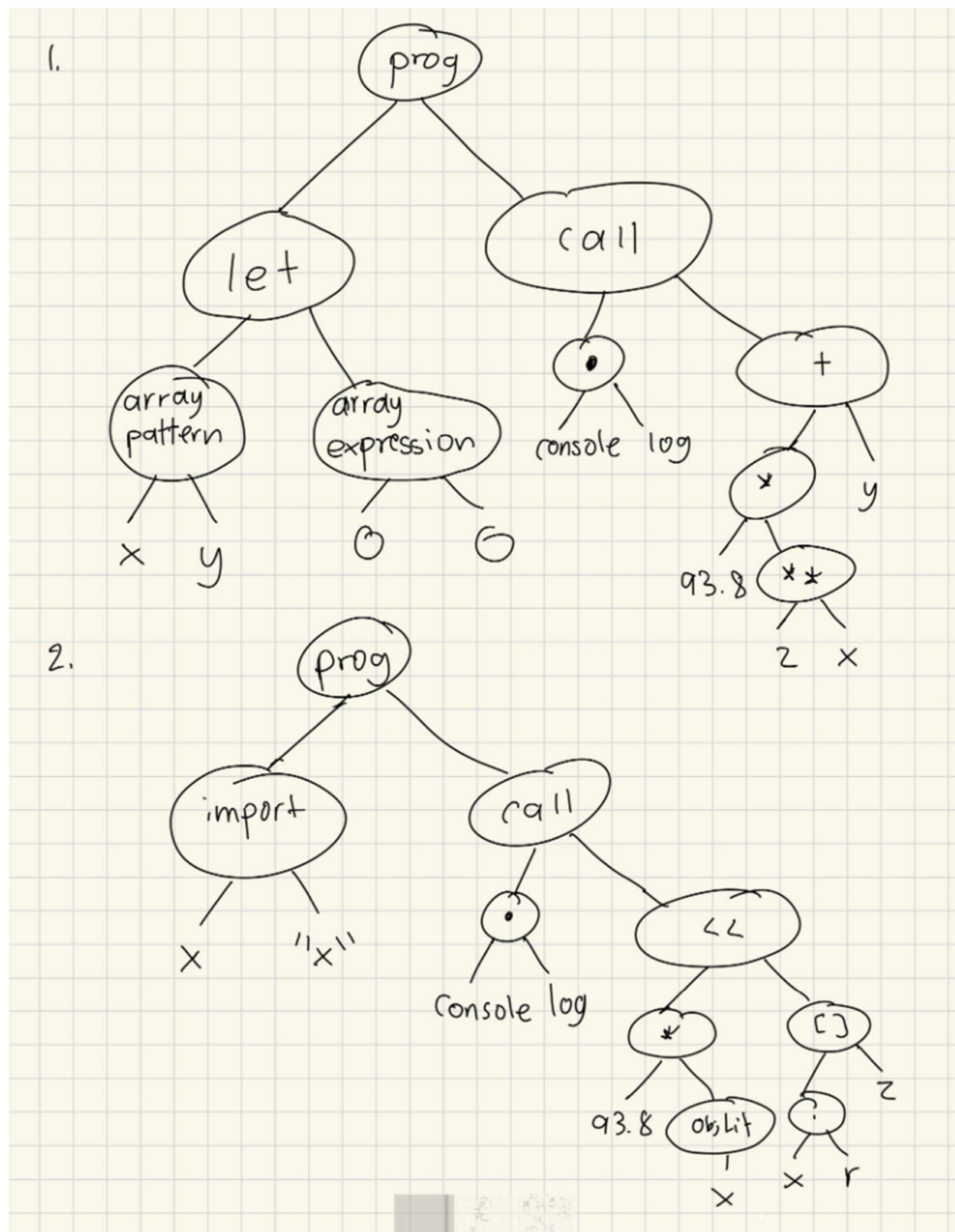
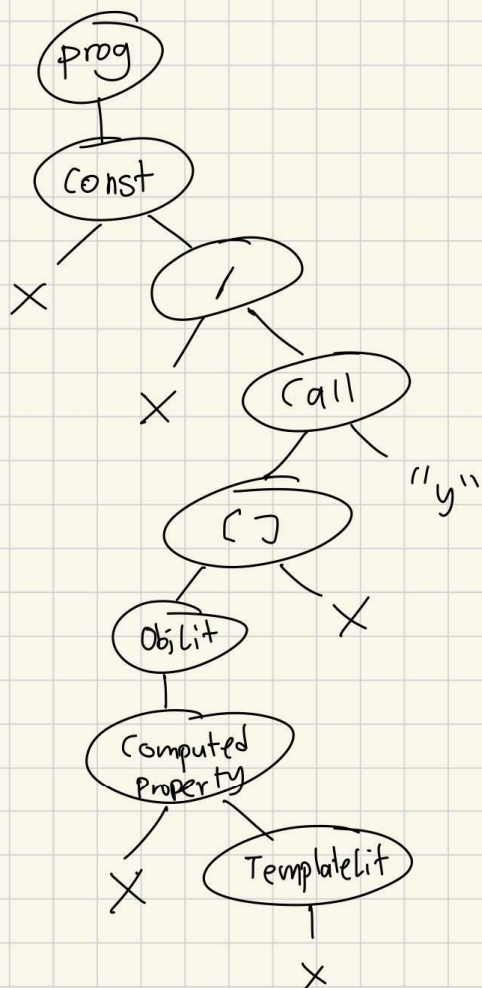


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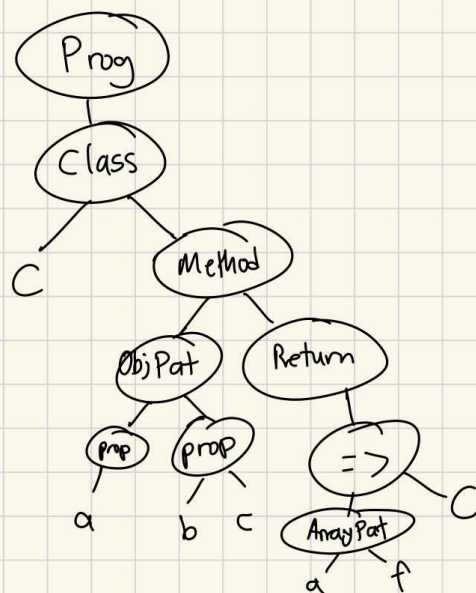
We have all read and watched the required material



3.



4.



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5. a.

```
Exp = Exp "+" Term | Exp "-" Term | Term
Term = Term "*" Factor | Term "/" Factor | Term "%" Factor |
Factor
Factor = Primary "**" Factor | Primary
Primary = "-" Primary | num | id | " (" Exp ")"
```

b.

```
Exp = "-"? (Exp "+" Term | Exp "-" Term | Term)
Term = Term "*" Factor | Term "/" Factor | Term "%" Factor |
Factor
Factor = Primary "**" Factor | Primary
Primary = num | id | " (" Exp ")"
```

c.

```
Exp = Exp "+" Term | Exp "-" Term | Term
Term = Term "*" Factor | Term "/" Factor | Term "%" Factor |
Factor
Factor = Primary "**" Factor | "-"? Primary
Primary = num | id | " (" Exp ")"
```

6.

```
Astro_plus {
    Program = StmtNoBreak+
    StmtNoBreak = id "=" Exp ";" --assign
                  | "print" Exp ";" --print
```

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```
        | IfStmtNoBreak
        | WhileStmt
Stmt = id "=" Exp ";" --assign
      | "print" Exp ";" --print
      | IfStmt
      | WhileStmt
      | BreakStmt
BreakStmt = break ";" --break
WhileStmt = while Exp Block
IfStmtNoBreak = if Exp BlockNoBreak else (BlockNoBreak)?
              | if Exp BlockNoBreak else IfStmtNoBreak
IfStmt = if Exp Block else (Block)?
        | if Exp Block else IfStmt
BlockNoBreak = "{" StmtNoBreak* "}"
Block = "{" Stmt* "}"
Exp = Condition ("<=" | "<" | "==" | "!=" | ">" | "=>")
Condition --binary
      | Condition
Condition = Condition ("+" | "-") Term --add
          | Term
Term = Term ("*" | "/" | "%") Factor --binary
      | Factor
Factor = Primary "***" Factor --power
        | "-" Primary --negate
        | Primary
Primary = id
        | numeral
        | "(" Exp ")" --parens
numeral = digit+ ( "." digit+ )? ( ("E"|"e") ("+"|"-")? digit+ )?
```

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```
idchar = letter | digit | "_"
print = "print" ~idchar
while = "while" ~idchar
if = "if" ~idchar
else = "else" ~idchar
break = "break" ~idchar
keyword = print | while | if | else | break
id = ~keyword letter idchar*
comment= "//" (~"\n" any)* --line
        | "/*" (~"*/" any)* "*/" --bracketed
space += comment
}
```