Problem Set 3
COMP301 Fall 2019
17.10.2019 17:30 - 18:45

Problem 1[1]: Let $p = [x = \lceil 33 \rceil, y = \lceil 22 \rceil]$
The derivation is:

$$\cfrac{\cfrac{\cfrac{\text{(value-of «x» p) = 33}}{\text{(value-of «-(x,11)» p) = 22}}}{\cfrac{\text{(value-of «zero?(-(x, 11))» p) = (bool-val \#f)}}{\text{(value-of «if zero?(-(x, 11)) then -(y, 2) else -(y, 4)» p)=(value-of «-(y, 4)» p)}}}\quad\cfrac{\text{(value-of «y» p) = 22}}{\text{(value-of «(-y, 4)» p)=18}}}{\text{(value-of «if zero?(-(x, 11)) then -(y, 2) else -(y, 4)» p)= 18}}$$

Problem 2[2]: Draw the abstract syntax tree for the lambda calculus expressions:
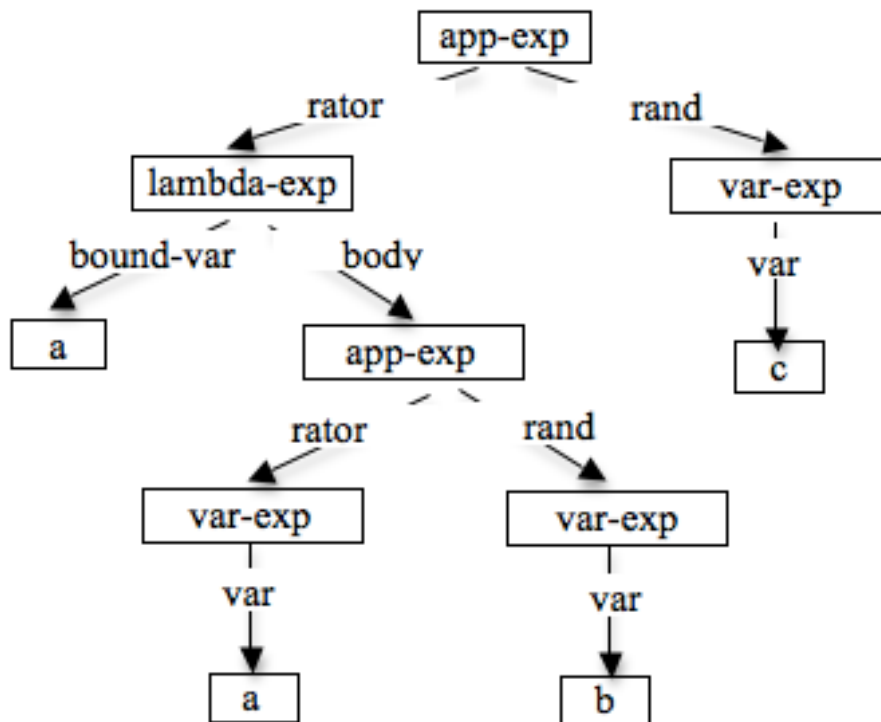
```
((lambda (a) (a b)) c)
```

```
app-exp
→lambda-exp var-exp
→a app-exp c
→var-exp var-exp
→a c
```

```
(lambda (x)
    (lambda (y)
       ((lambda (x)
           (x y))
        x)))
```

```
lambda-exp
→x lambda-exp
→y app-exp
→lambda-exp var-exp
→x app-exp x
→var-exp var-exp
→x y
```