QUIZ 7-8
COMP301 Fall 2021
Week 8: 26.11.2021

QUIZ 7: Write the names of all expressions existing in LET language.

const-exp
var-exp
if-exp
diff-exp
zero?-exp
let-exp

```
(value-of (diff-exp exp1 exp2) ρ)
= (num-val
    (-
      (expval->num (value-of exp1 ρ))
      (expval->num (value-of exp2 ρ))))
```

FIGURE 1. Behavior implementation of diff-exp

QUIZ 7: Considering the behavior implementation of diff-exp given above:

Explain the importance and functionality of **expval->num** procedure in this implementation. In other words, can not we just apply a subtraction between (value-of exp_1 ρ) and (value-of exp_2 ρ) directly? If we can not, explain the reason.

We can NOT apply a subtraction between `value-of` expressions because the result of a value-of expression is an expressed value. Minus operator "-", does not operate on an expressed value, it can only be used with actual numeric values. Therefore, to be able to use it we cast the expressed values to numbers with the `expval->num` procedure.

Quiz 8: Consider the following statement where env_1 and env_2 are environments:

```
(apply-procedure (procedure x (diff-exp (var-exp x) (var-exp y)) env1)
(num-val 9)) = (value-of (diff-exp (var-exp x) (var-exp y)) env2)
```

a: Define env_2 by using env_1.

b: If env_1 = [y = (num-val 5)], find the result of the code above.

a: env_2 = [x = (num-val 9)]env_1
b: (num-val 4)

Quiz 8:

a: Fill in the blanks.

```
(define-datatype proc __a__
    (procedure
      (var __b__)
      (body __c__)
      (__d__ environment?)))
```

b: Determine whether the statements below about PROC language are True or False.
i. Procedures are expressed values. T/F
ii. Procedures are denoted values. T/F

a.

```
(define-datatype proc proc?
    (procedure
      (var identifier?)
      (body expression?)
      (saved-env environment?)))
```

b. T- T