

# ENGF0002 (Design and Professional Skills)

## Scenarios

The focus of this document is on the differences in the implementation of mutable variables between the three prototypes of the programming language. It follows an observation-explanation-conclusion structure in that an observation is laid down, explained, and a theory is formulated out of it.

### Classifier-1 (1.rkt)

```
#lang MutableVars  
  
a = "old"  
  
fun update(b):  
  b := "new"  
end  
  
update(a)  
print(a)
```

---

```
Welcome to DrRacket, version 7.0 [3m].  
Language: MutableVars, with debugging; memory limit: 128 MB.  
version: 2018-09-04T22:54:09-04:00
```

```
-----Core 1-----
```

```
"old"
```

```
-----Core 2-----
```

```
"new"
```

```
-----Advanced 1-----
```

```
"new"
```

*Partition after test: {Core 2, Advanced 1}, {Core 1}*

Observation-1: When a mutable variable is changed in a function, then Core-1 keeps the change, while Core-2 and Advanced-1 do not keep the change.

Theory-1: As shown in ML-7, a mutable structure (variable in this case) that is passed as a parameter to a function in Core-1 is passed by reference. Therefore, any changes made to the parameter are kept. Core 2 and Advanced-1, on the other hand, pass a copy of the variable to the function and therefore any changes made are local to that function.

## Classifier-2 (2.rkt)

```
#lang MutableVars

a = "old"

fun update(b):
  a := "new"
  print(a)
end

update(a)
print(a)
```

---

```
Welcome to DrRacket, version 7.0 [3m].
Language: MutableVars, with debugging; memory limit: 128 MB.
version: 2018-09-04T22:54:09-04:00
```

```
-----Core 1-----
```

```
"new"
"new"
```

```
-----Core 2-----
```

```
"new"
"new"
```

```
-----Advanced 1-----
```

```
"new"
"old"
```

*Partition after test: {Core 1, Core 2}, {Advanced 1}*

Observation-2: When a mutable variable- that is declared outside a function- is changed inside one, then Core-1 and Core-2 keep the change. However, Advanced-1 does not permanently change the value assigned to the variable.

Theory-2: A variable declared outside a function block is global to the entire program.

When the value assigned to such a variable is changed inside a function, then Core-1 and Core-2 keep the change; indicating that a global variable can be permanently mutated inside a function. Advanced-1, on the other hand, only allows this change to be local and does not permanently change the value of the variable.

