

To-Do

Lecture 21 introduced the “first half” of the MyPL VM instructions. Be sure to do the following.

1. **Finish up HW-4.** You should be finishing up HW-4, which is due on Wed.
2. **Review the lecture notes.** Be sure you review the lecture notes to ensure you understand each of the instructions we went over.
3. **Practice Problems.** Do the following practice problems.

Practice Problems

For each of the following MyPL code snippets, generate the corresponding VM instructions (similar to what we did in class). Assume **x** is stored in memory index 0, and **y** is stored in memory index 1. Answers are provided on the next page.

1.

```
var x = 42
var y = x + 1
```
2.

```
var x = 2
var y = 3
x = (x * y) + (y - x)
```
3.

```
var x = 10
while x > 0 {
  x = x - 2
}
var y = x
```
4.

```
var x = false
var y = 0
if x {
  y = 1
}
```
5.

```
var x = false
var y = 0
if x {
  y = 1
}
else {
```

```
    y = 2  
}
```

```
6.  var x = true  
    var y = 0  
    if not x {  
        y = 1  
    }  
    else if x {  
        y = 2  
    }  
    else {  
        y = 3  
    }  
}
```

<i>Practice Problem Solutions</i>

1. 0: PUSH(42)
 1: STORE(0)
 2: LOAD(0)
 3: PUSH(1)
 4: ADD()
 5: STORE(1)

2. 0: PUSH(2)
 1: STORE(0)
 2: PUSH(3)
 3: STORE(1)
 4: LOAD(0)
 5: LOAD(1)
 6: MUL()
 7: LOAD(1)
 8: LOAD(0)
 9: SUB()
 10: ADD()
 11: STORE(0)

3. 0: PUSH(10)
 1: STORE(0)
 2: PUSH(0)
 3: LOAD(0)
 4: CMPLT()
 5: JMPF(11)
 6: LOAD(0)
 7: PUSH(2)
 8: SUB()
 9: STORE(0)
 10: JMP(2)
 11: LOAD(0)
 12: STORE(1)

4. Note that this is the “general” solution for **if** – yours may vary slightly (e.g., the last **JMP** is not necessary in this example).

 0: PUSH(false)
 1: STORE(0)
 2: PUSH(0)
 3: STORE(1)
 4: LOAD(0)

```
5: JMPF(9)
6: PUSH(1)
7: STORE(1)
8: JMP(9)
9: NOP()
```

```
5.  0: PUSH(false)
    1: STORE(0)
    2: PUSH(0)
    3: STORE(1)
    4: LOAD(0)
    5: JMPF(9)
    6: PUSH(1)
    7: STORE(1)
    8: JMP(11)
    9: PUSH(2)
   10: STORE(1)
   11: NOP()
```

```
6.  0: PUSH(true)
    1: STORE(0)
    2: PUSH(0)
    3: STORE(1)
    4: LOAD(0)
    5: NOT()
    6: JMPF(10)
    7: PUSH(1)
    8: STORE(1)
    9: JMP(17)
   10: LOAD(0)
   11: JMPF(15)
   12: PUSH(2)
   13: STORE(1)
   14: JMP(17)
   15: PUSH(3)
   16: STORE(1)
   17: NOP()
```