

Worksheet 7B

Quiz 1: Definition and Call using Code-Label

Fill in the assembly for defining and calling inc.

Definition: <(fun (inc_def x) (add1 x))>

```
; DEFINITION
```

```
fun_start_inc_def:
```

```
push rbp
mov rbp, rsp
sub rsp, 8*1000
```

```
mov rsp, rbp
pop rbp
ret
```

Call: <(inc 5)> (where inc is at stack slot 2)

Quiz 2: Definition and Call using (Arity, Code Label)

Fill in the assembly for defining and calling inc using the (arity, code-label) representation.

Definition: <(fn (x y) (+ x y))>

```
fun_start_#lambda_0:
```

```
push rbp
mov rbp, rsp
sub rsp, 8*2
mov rax, [rbp - 8*-2]
add rax, [rbp - 8*-3]
mov rsp, rbp
pop rbp
ret
```

```
fun_finish_#lambda_0:
```

```
; 2. WRITE (arity, label) at [r11], [r11+8]
```

```
; 3. INCREMENT r11, and set/tag rax
```

Call: <(inc 5)>

```
; 1. compute/push params
```

```
; 2. LOAD `fn` from stack-slot into `rax`
```

```
; 3. CHECK `rax` has function tag 0101
```

```
; 4. STRIP tag
```

```
; 5. CHECK arity
```

```
; 6. CALL code-label
```

Quiz 3: Definition: Function Body and Closure Vector

Fill in the assembly for the *function body* and *closure vector* for `(fn (x) (+ x one))` where `one` is a free variable.

Function Body

```

jmp fun_finish_#lambda_0
fun_start_#lambda_0:
; setup
push rbp
mov rbp, rsp
sub rsp, 8*3

; load free variables ... from where?
_____
_____
_____

; <(+ x one)>
_____
_____

; teardown
mov rsp, rbp
pop rbp
ret
fun_finish_#lambda_0:

```

Closure Vector (arity, label, num-free, free-values)

```

; write arity
_____
_____

; write label
_____
_____

; write number of free vars (why?)
_____
_____

; write free vars
_____
_____

; bump r11 and set/tag rax
mov rax, r11
add r11, _____ ; how much?
add rax, 5

```

Quiz 4: Call using Closure

Fill in the assembly for the call `(inc 99)` where `inc` is a closure.

```

; push the args
_____
_____

; load closure pointer
_____

; check tag & arity & strip tag
_____

; get call-target
_____

; push "closure" as first arg!
_____
_____

; call!
_____
_____

```

Quiz 5: Your turn!

What is something you found confusing in today's lecture (or earlier)?