Second In-Class Exam

CMPSC 461: Programming Language Concepts (Spring 2018). Dr. Gang Tan

Problem 1:

a. True, in C all parameters are passed by value, including pointer parameters; pass by reference is not supported.
b. False, an out parameter in Ada can be implemented by pass by result or pass by reference depending on the size of the parameter.
c. False, the dynamic link of the callee's activation record points to the caller's activation record.
d. False, both can introduce multiple local variables.
e. True, C++11 can support lambda functions.
f. False, a function in C cannot return functions.
g. False, the curried version takes one parameter at a time.
h. True, an example is a b c = (a b) c.
i. False, you cannot rename free variables.
j. False, Lambda calculus is Turing complete, meaning it can perform any computation.

Problem 2:

a. i=1, a[2]=2
b. i=2, a[2]=1
c. i=2, a[2]=1
d. i=2, a[2]=2

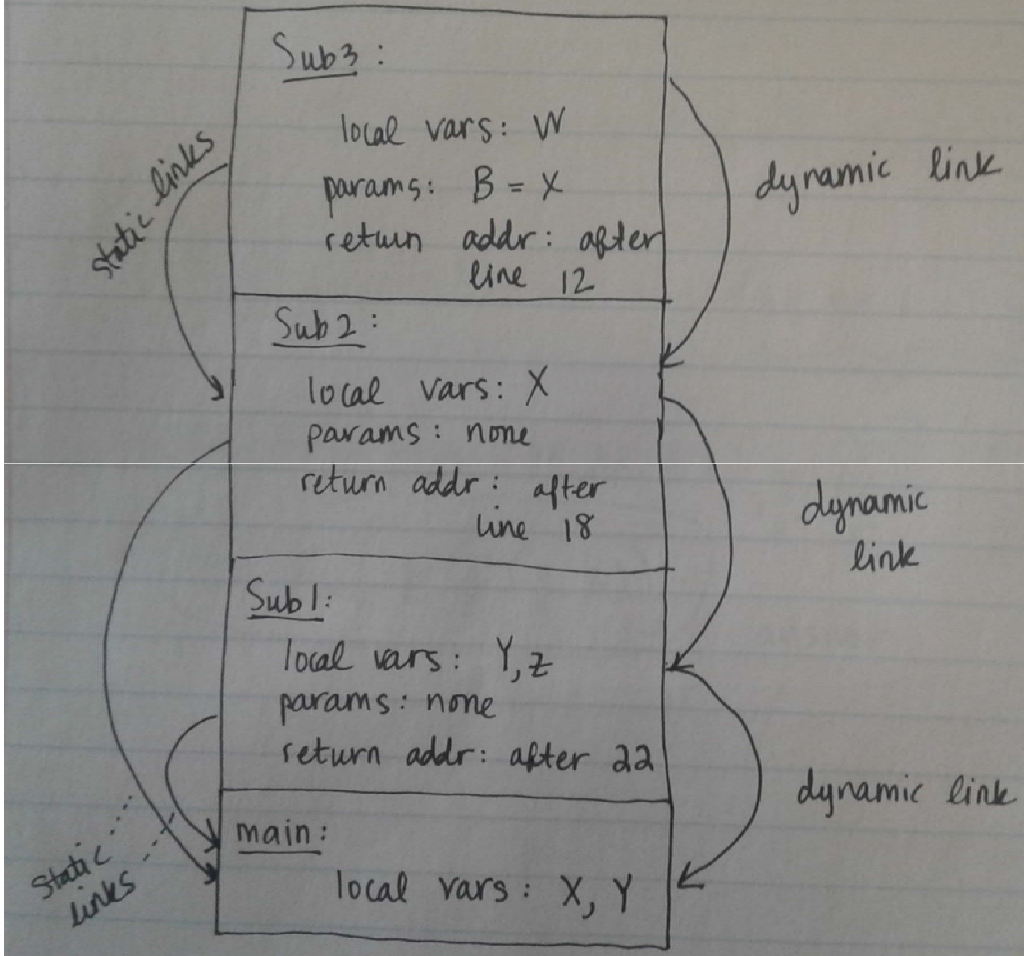
Problem 3:

```
(define (maxIntHelper k l)
 (if (null? l) k
     (if (> (car l) k) (maxIntHelper (car l) (cdr l))
         (maxIntHelper k (cdr l)))))

(define (maxInt l)
 (if (null? l) 0
     (maxIntHelper (car l) (cdr l))))
```

Problem 4:

#4.



Sub3:

local vars: W

params: B = X

return addr: after line 12

Sub2:

local vars: X

params: none

return addr: after line 18

Sub1:

local vars: Y, Z

params: none

return addr: after 22

main:

local vars: X, Y

Problem 5:

(λn. λm. λf. λx. n f (m f x)) (λf. λx. f (f x)) (λf. λx. f x)

➔ (λm. λf. λx. (λf. λx. f (f x)) f (m f x)) (λf. λx. f x)

➔ λf. λx. (λf. λx. f (f x)) f ((λf. λx. f x) f x)

➔ λf. λx. (λf. λx. f (f x)) f ((λx. f x) x)

➔ λf. λx. (λf. λx. f (f x)) f (f x)

➔ λf. λx. (λx. f (f x)) (f x)

➔ λf. λx. f (f (f x))