**Worksheet Assessment 2**

Student Name: Noreen Lenihan

Student ID: 13204807

Course: COMP47160 Advanced Java & DSA

Course Instructor: Dr. Rem Collier

Due date: Fri, 7 Feb

Question 2

<algorithm cost>

= <cost of assignment>+ <cost of loop> + <cost of return>

= 1 + <cost of loop> + 1

<cost of loop>

= <cost of initial assignment> + <cost of guard> +

(<cost of guard> + <cost of increment> +

<cost of inner statements> ) \* <number of iterations>

= 1 + 2 + (2 + 2 + 3) \* n

= 3 + 7n

Algorithm program()

Input: none

Output: none

print(“enter a number: “) // Print (1)

num ← read() // Assignment (1), Read (1)

print(“you entered: “) // Print (1)

if (num < 10000) print(“0”) // Compare (1), Print (1)

if (num < 1000) print(“0”) // Compare (1), Print (1)

if (num < 100) print(“0”) // Compare (1), Print (1)

if (num < 10) print(“0”) // Compare (1), Print (1)

println(num) // Print (1)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Operation Count: 13

Big-Oh Estimation Running time: O(1)

Question 5

Algorithm program()

Input: none

Output: none

i ← 20

while i >= 0 do // Initial assignment (1) + Cost of guard (1) +

(Cost of guard(1) + decrement(2) + compare(1) + if-print(1) + inner statements(1))\*11 - (no-print-on-first-iteration(1))

if i < 20 then print(“,”)

print(i)

i ← i – 2

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Operations Count: 67

Big-Oh Estimation Running time: O(1)

Question 8

Algorithm program()

Input: none

Output: none

Let A be an array containing {5, 7, 3, 12, 6, 11, 1, 19, 9, 4} //Assignment(1)

j ← 1 //Assignment(1)

t ← A[0]

//Assignment + Indexing(2)

while j < 10 do

(guard(1)

A[j-1] ← A[j] + (guard(1) + increment(2)

j ← j + 1

+ inner statement(4))\*9

A[j-1] ← t //Assignment, arithmetic, index (3)

for each value, j, in the range 0 to 9 do //Initial assignment(1) + guard(1) + (guard(1) + inner statements(3)+ increment(2))\*10

print(A[j] + “ “)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total operation count: 133

Big-Oh Estimation Running time: O(1)

Question 9

Algorithm fn(num, digits)

Input: num and digits

Output: output

output ← “” // Assignment(1)

mult = 1 // Assignment(1)

for each value, j, in the range 1 to digits do //Initial assignment(1) + guard(1) + ((inner if-statement)(3) + multi-value-increment(2) + guard(1) + j-increment(2)) \* d

if num < mult then output ← output + “0”

mult = mult \* 10

output ← output + num // Assignment + concat(2)

return output // Return (1)

Algorithm program()

Input: None

Output: None

println(fn(75, 6)) // Print + method call (2)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Total Operations Count: ((8\*6) + 9 – (4)) = 53

(We subtracted 4 above, as the if-statement will not evaluate to true on the first two iterations (when num or 75 is NOT less than mult)

Generic operation counting (if values for variables unknown): 8\*digits + 9 (or 8n + 9)

Big-Oh Estimation running time: O(n)