Edward Yaroslavsky 11/1/19 HW4 CS385

I pledge my honor that I have abided by the Stevens Honor System.

1. In order to generate the binary numbers in order from the binary reflected Gray code algorithm, you would have to copy list L1 to list L2 in the proper order rather than reversed order as the first instruction after the else block.
2. n m  
   72 93  
   36 186  
   18 372  
   9 744  
   4 1488 (+744)  
   2 2976  
   1 5952 +(744) = 6696

3a) The worst-case inputs for the quicksort would be if the array is strictly increasing with either the first or last element being the pivot. This is because when the partition algorithm is completed, either the first or last elements would swap with themselves, depending on whether the pivot was the first or last element, and would leave the rest of the array to sort through, only going through one element at a time.

b) θ(n2)

1. c = 2205 x 1132

c2 = a1 x b1 = 22 x 11

c0 = a0 x b0 = 05 x 32

c1 = (a1 + a0) x (b1 + b0) – (c2 + c0) = (22 + 05) x (11 + 32) – (22 x 11 – 05 x 32)

= 27 x 43 – (242 - 160) = 1161 – 242 – 160 = 759

22 x 11

c2 = 2 x 1 = 2

c0 = 2 x 1 = 2

c1 = (2 + 2) x (1 + 1) – (2 + 2) = 4

c = 2 x 102 + 4 x 101 + 2 = 242

05 x 32

c2 = 0 x 3 = 0

c0 = 5 x 2 = 10

c1 = (0 + 5) x (3 + 2) – (0 + 10) = 15

c = 0 x 102 + 15 x 101 + 10 = 160

15 x 10

c2 = 1 x 1 = 1

c0 = 5 x 0 = 0

c1 = (1 + 5) x (1 + 0) – (1 + 0) = 4

c = 1 x 102 + 5 x 101 + 0 = 150

27 x 43

c2 = 2 x 4 = 8

c0 = 7 x 3 = 21

c1 = (2 + 7) x (4 + 3) – (21 + 8) = 34

c = 8 x 102 + 34 x 101 + 21 = 1161

c = 2205 x 1132 = 242 x 104 + 759 x 102 + 160 = 2496060

1. A close up of a necklace

   Description automatically generated

6a) 10, 8, 5, 3, 5, 2, 1, 7, 1, 6

b) 3, 5, 5, 8, 1, 2, 10, 1, 7, 6

c) 3, 5, 5, 1, 2, 8, 1, 6, 7, 10

d) 5 internal nodes

e) 5 leaves

f) width = 4

g) height = 3

h) diameter = 5

7a) a = 2, b = 4, d = 0

θ(nlog42)

b) a = 2, b = 4, d = .5

θ( log4 n)

c) a = 2, b = 4, d = 1

θ(n)

d) a = 2, b = 4, d = 2

θ(n2)

e) a = 2, b = 4, d = 3

θ(n3)

8a) T(n) = 6T(n / 3) + θ(n3/2)

b) a = 6, b = 3, d = 3/2

θ(nlog36)