Brandon Patton

HW4

1. When L1 is copied to L2, do not reverse the order, just make L2 a copy of L1

2. 72×93
   36×186
   18×372
   9×744
   4×1488 (+744)
   2×2976
   1×5952
   5952 (+744) = **6696**

3A. For worst case running time, it is mentioned that the input of k=n and a strictly increasing array would run very poorly in comparison to other inputs

B. The running time of the above mentioned input would be $\frac{n(n-1)}{2} \in \Theta(n^2)$

→

4. 2205×1152

$a_1\ a_0 \quad b_1\ b_0$

$C_2 = a_1 \times b_1 = 22 \cdot 11 = 242$

$C_0 = a_0 \times b_0 = 5 \cdot 32 = 160$

$C_1 = (a_1 + a_0)(b_1 + b_0) - (C_2 + C_0) = 1161 - 402 = 759$

2242000
$\quad 75900$
$+ \quad 160$
$\overline{2496060}$

$2|2 \times 1|1$

$a_1\ a_0 \quad b_1\ b_0$

$C_2 = 2 \cdot 1 = 2$

$C_0 = 2 \cdot 1 = 2$

$C_1 = 4 \cdot 2 - 4 = 4$

200
40
$+ \quad 2$
$\overline{242}$

$0|5 \times 3|2$

$a_1\ a_0 \quad b_1\ b_0$

$C_2 = 0 \cdot 3 = 0$

$C_0 = 5 \cdot 2 = 10$

$C_1 = 5 \cdot 5 - 10 = 15$

0000
$\quad 150$
$+ \quad 10$
$\overline{160}$

$2|7 \times 4|3$

$a_1\ a_0 \quad b_1\ b_0$

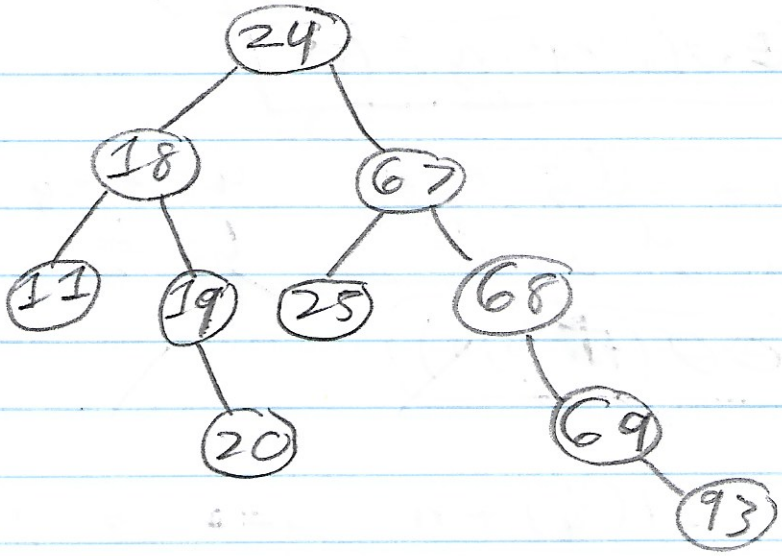
$C_2 = 2 \cdot 4 = 8$

$C_0 = 7 \cdot 3 = 21$

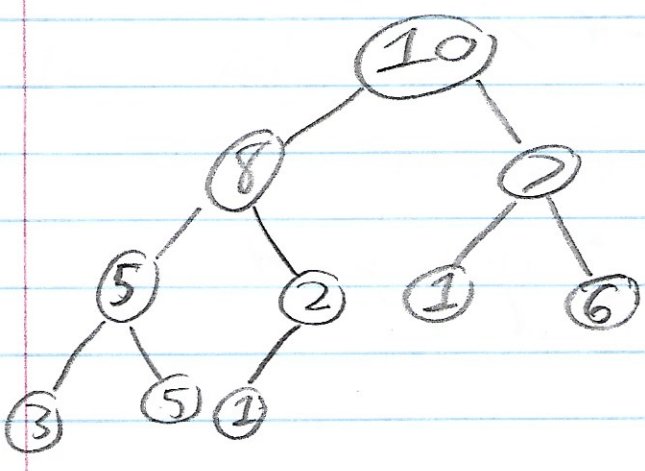
$C_1 = 9 \cdot 7 - 29 = 34$

800
340
$\quad 21$
$\overline{1161}$

5. 24, 18, 67, 68, 69, 25, 19, 20, 11, 93



6.



A. preorder: 10, 8, 5, 3, 5, 2, 1, 7, 1, 6
B. inorder: 3, 5, 5, 8, 2, 1, 10, 1, 7, 6
C. postorder: 3, 5, 5, 1, 2, 8, 1, 6, 7, 10
D. [5] internal nodes
E. [5] leaves
F. Maximum width: [4]
G. Height: [3]

7A. $T(n) = 2T(n/4) + 1$ $a=2$ $b=4$ $d=0$

$a > b^d$, $2 > 4^0$, $2 > 1$ ✓

$\in \Theta(n^{\log_4 2}) \sim \Theta(\sqrt{n})$

B. $T(n) = 2T(\frac{n}{4}) + \sqrt{n}$ $a=2$ $b=4$

$a = b^d$ $2 = 4^{1/2}$ $2=2$ ✓ $d = \frac{1}{2}$

$\in \Theta(\sqrt{n} \log n)$

C. $T(n) = 2T(\frac{n}{4}) + n$ $a=2$ $b=4$

$a < b^d$, $2 < 4^1$, $2 < 4$ ✓ $d = 1$

$\in \Theta(n)$

D. $T(n) = 2T(\frac{n}{4}) + n^2$ $a=2$ $b=4$

$a < b^d$, $2 < 4^2$, $2 < 16$ ✓ $d = 2$

$\in \Theta(n^2)$

E. $T(n) = 2T(\frac{n}{4}) + n^3$ $a=2$ $b=4$ $d=3$

$\in \Theta(n^3)$

8 A. $T(n) = 6T(\frac{n}{3}) + n\sqrt{n}$

B. $a = 6 \quad b = 3 \quad d = \frac{3}{2}$

$a > b^d, \quad 6 > 3^{\frac{3}{2}}, \quad 6 > 5.19$ ✓

$\in \Theta(n^{\log_3 6})$

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

Brenda Patton