Liam Brew
I pledge my honor that I have abided by the Stevens Honor System. - [signature]

(1) The change that I would make would be to copy L1 to L2 in order instead of backwards

(2)

n	M	
72	93	
36	186	
18	372	
9	744	744
4	1483	+
2	2976	
1	5952	5952
		6896

Answer = 6896

(3) The partition would run at its worst case time of n^2 if the list was in reverse order. In general, the more sorted a list is in terms of having low inversion counts, the worse the partition will perform until it reaches its worst-case running time of $O(n^2)$.

(4) 2205 x 1132, $C_2 = a_1 \cdot b_1$, $C_0 = a_0 \cdot b_0$, $C_1 = (a_1 + a_0)(b_1 + b_0) - (C_2 + C_0)$

22 | 05 x 11 | 32
a_1 a_0 b_1 b_0

$\Rightarrow$ 200 + 40 + 2 = 242

$C_2 = (22)(11) = 242$ *
$C_0 = (05)(32) = 160$ **
$C_1 = (a_1 + a_0)(b_1 + b_0) - (C_2 + C_0)$
$= 27 \cdot 43 - 759$ ***
$= 759$

* 2 | 2 x 1 | 1
a_1 a_0 b_1 b_0

$C_2 = (2)(1) = 2$
$C_0 = (2)(1) = 2$
$C_1 = 8 - (2+2)$
$= 4$

** 0 | 5 x 3 | 2
a_1 a_0 b_1 b_0

$\Rightarrow$

$C_2 = 0 \cdot 3 = 0$
$C_0 = 5 \cdot 2 = 10$
$C_1 = 5 \cdot 5 - (0+10)$
$25 - 10$
15

2 | 7 x 4 | 3
a_1 a_0 b_1 b_0

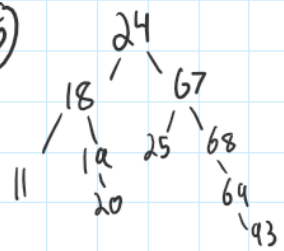
$\Rightarrow$

800 + 340 + 21 = 1161
$C_2 = (2)(4) = 8$
$C_0 = (7)(3) = 21$
$C_1 = (9)(7) - (8+21)$
$= 63 - 24$
$= 34$

$$\begin{array}{r} 242 \\ 759 \\ + \quad 160 \\ \hline 2,496,060 \end{array}$$

2,496,060

(5)



(6) (a) 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
(e) 5
(f) 4
(g) 3
(h) 6

(7) (a) $\Theta(n^{\log_4 2}) = \Theta(n^{\frac{1}{2}}) = \Theta(\sqrt{2})$
(b) $\Theta(n^{\frac{1}{2}} \cdot \log_4 n) = \Theta(\sqrt{2})$
(c) $\Theta(n)$
(d) $\Theta(n^2)$
(e) $\Theta(n^3)$

(8) (a) $T(n) = 6T(n/3) + n^{3/2}$
(b) $\Theta(n^{\log_3 6})$