Homework 6

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1 Exercieses 6.2 - 1

$$C = \begin{bmatrix} 1 & 1 & 1 & 2 \\ 2 & 1 & 1 & 3 \\ 1 & -1 & 3 & 8 \end{bmatrix} row2 - 2row1, row3 - row1$$

$$C = \begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & -1 & -1 & -1 \\ 0 & -2 & 2 & 6 \end{bmatrix} row3 - 2row2$$

$$C = \begin{bmatrix} 1 & 1 & 1 & 2 \\ 0 & -1 & -1 & -1 \\ 0 & 0 & 4 & 8 \end{bmatrix}$$

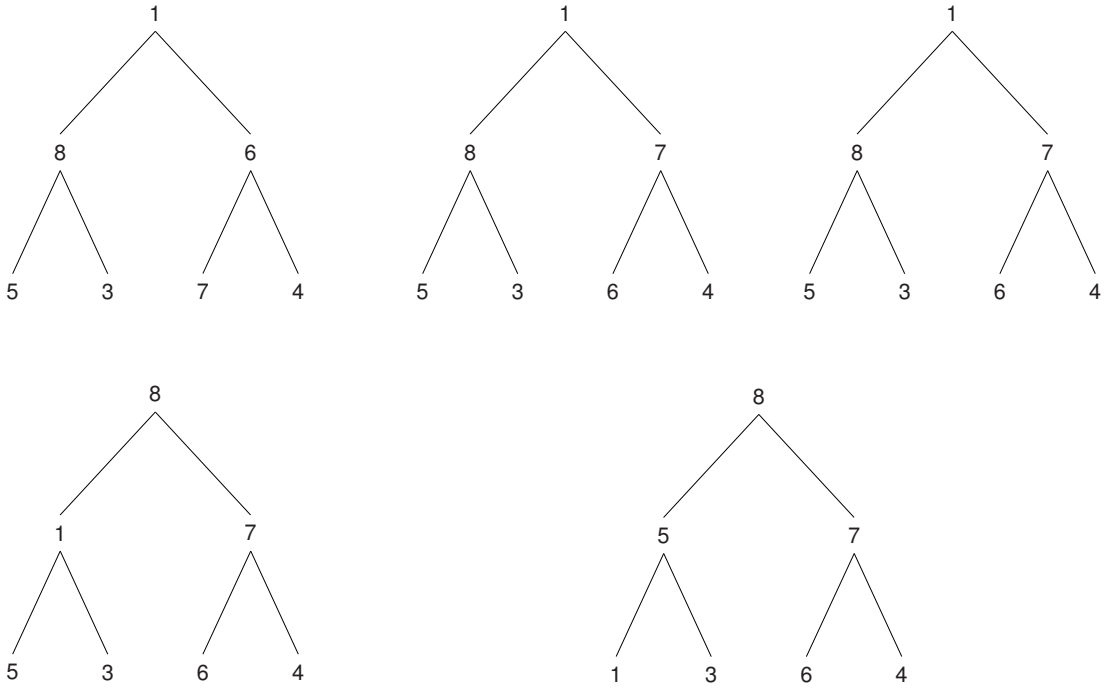
Now we can obtain the solution by back substituations:
$x_3 = 8/4 = 2, x_2 = (-1 + x_3)/(-1) = -1, x_1 = 2 - x_2 - x_3 = 1$

2 Exercieses 6.2 - 4

The final answer is correct. The derivation is almost correct except the last step. In the last step, $S(n)_1, S(n)_2$, and $S(n)_3$ should not be added wholly. They should be added up for their detailed expressions.

3 Exercieses 6.4 - 1

a.



b.

1
1 8
8 1 6
8 1 6 5
8 5 6 1 3
8 5 6 1 3 7
8 5 7 1 3 6 4

c.

No. It's not. They can yield different heaps for same input, which are both correct.

4 Exercieses 6.5 - 1

$$\begin{aligned} C(n) &= \sum_{i=1}^{n}(\sum_{j=1}^{i}(1+1)) \\ &= \sum_{i=0}^{n}(i+1) \\ &= \frac{n(n+1)}{2} + (n+1) \\ &= \frac{(n+1)(n+2)}{2} \in \theta(n^2) \end{aligned}$$

5 Exercieses 6.5 - 4

a

coefficients	3	-1	0	2	5
x = -2	3	(-2)× 3-1=-7	(-2)× (-7)=14	(-2)× 14+2=-26	(-2)× (-26)+5=57

b

As shown above, the quotient is $3x^3 - 7x^2 + 14x - 26$, the remainder is 57.