

# CLRS Exercise

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**1 15**

**2 15.1-1**

$$2^n - 1 = \sum_{j=0}^{n-1} 2^j$$

**3 15.1-2**

Do not know how!

**4 15.1-3**

See Code

**5 15.1-4**

See Code

**6 15.1-5**

See Code

**7 15.2-1**

See Code

**8 15.2-2**

See Code

Ex 15.2.4

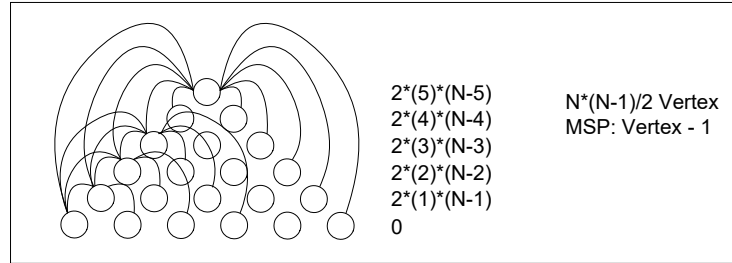


Figure 1: 15.2-4

## 9 15.2-3

Assume that  $\forall k \leq n-1, T(k) \geq c2^k$

Then  $T(n) = \sum_{k=1}^{n-1} T(k)T(n-k) = (n-1)c^22^n > c2^n$

So  $T(n) = \Omega(n), \omega(n)$

## 10 15.2-4

See Figure 1

## 11 15.2-5

For each level  $h(i) = i(n-i)$

For tree  $T(n) = 2\sum_{i=1}^{n-1} i(n-i)$

$$= \frac{3n^3+3n^2}{3} - \frac{2n^3+3n^2+n}{3}$$

$$= \frac{n^3-n}{3}$$

## 12 15.2-6

Assume that  $\forall k \leq n-1, N(k) = k-1$

Then  $N(n) = N(n-1) + 1$

So  $N(n) = n-1$