CIS313 Homework #3 Sample Solution

7.16

$$
\begin{aligned}
T(1) &= C \\
T(n) &= 7T(n/2) + Cn^2
\end{aligned}
$$

According to Master's Method,

$$T(n) = \Theta(n^{log_2 7})$$

7.24

$$
\begin{aligned}
T(n,0) &= 1 \\
T(n,n) &= 1 \\
T(n,k) &= T(n-1,k-1) + T(n-1,k)
\end{aligned}
$$

The closed form formula is

$$T(n) = \Theta(C(n,k))$$

11.2
```
(1) 1 2 + 3 4 ^ -
(2) 1 2 ^ 3 4 * -
(3) 1 2 3 * + 4 5 ^ - 6 +
(4) 1 2 + 3 * 4 5 6 - ^ -
```

11.3 a.
```
 ----
 |   a + b ^ c * d ^ e ^ f - g - h / (i + j)
 ----

   -----
a b | +    ^ c * d ^ e ^ f - g - h / (i + j)
   -----

    ------
a b c | + ^  * d ^ e ^ f - g - h / (i + j)
    ------
```

```
           ------
a b c ^ d  | + *   ^ e ^ f - g - h / (i + j)
           ------
            --------
a b c ^ d e | + * ^   ^ f - g - h / (i + j)
            --------
              ---------
a b c ^ d e f | + * ^ ^  - g - h / (i + j)
              ---------
                    ----
a b c ^ d e f ^ ^ * | +   - g - h / (i + j)
                    ----
                        ----
a b c ^ d e f ^ ^ * + g | -   - h / (i + j)
                        ----
                            ----
a b c ^ d e f ^ ^ * + g - h | -   / (i + j)
                            ----
                              -------
a b c ^ d e f ^ ^ * + g - h i | - / (  + j)
                              -------
                                ----------
a b c ^ d e f ^ ^ * + g - h i j | - / ( +   )
                                ----------
                                      ----
a b c ^ d e f ^ ^ * + g - h i j + / - |
                                      ----
```

b.

```
----
|     a b c ^ d e f ^ ^ * + g - h i j + / -
----
-------
| a b c  ^ d e f ^ ^ * + g - h i j + / -
-------
-----------------
| a (b ^ c) d e f ^ ^ * + g - h i j + / -
-----------------
---------------------
| a (b ^ c) d (e ^ f)  ^ * + g - h i j + / -
---------------------
-------------------------
| a (b ^ c) (d ^ (e ^ f))  * + g - h i j + / -
-------------------------
```

```
------------------------------
| a ((b ^ c) *  (d ^ (e ^ f)))  + g - h i j + / -
------------------------------
------------------------------------
| (a + ((b ^ c) *  (d ^ (e ^ f)))) g - h i j + / -
------------------------------------
----------------------------------------------
| ((a + ((b ^ c) *  (d ^ (e ^ f)))) - g) h i j + / -
----------------------------------------------
--------------------------------------------------
| ((a + ((b ^ c) *  (d ^ (e ^ f)))) - g) h (i + j) / -
--------------------------------------------------
------------------------------------------------------
| ((a + ((b ^ c) *  (d ^ (e ^ f)))) - g) (h / (i + j))  -
------------------------------------------------------
----------------------------------------------------------
| ((a + ((b ^ c) *  (d ^ (e ^ f)))) - g) -  (h /  (i + j))
----------------------------------------------------------
```

c.

```
        -
      /   \
     -     /
    / \   / \
   +   g h   +
  / \       / \
 a   *     i   j
   /   \
  ^     ^
 / \   / \
b   c d   ^
         / \
        e   f
```