Assignment 6 answer key
Ling 106

1. (a) S, X, C
   (b) a, b, c
   (c) 1. abbc, 2. aabbbb, 3. aaabbbbb, 4. aaabbbbbbc
   (d) See next page for trees.
   (e) c, abc, acbb, aabbbc
   (f) Yes, \( \{a^ib^jc^k \mid i > 0, j = 2i, k \geq 0 \} \) is a correct description of the language
      generated by this grammar.

2. Construct a context free grammar G to generate the language
   \( \{a^n b^m c^m d^m \mid n \geq 1 \text{ and } m \geq 0 \} \).
   Let \( G = (V, T, R, S) \), where R =
   
   \[ S \rightarrow AB \]
   \[ A \rightarrow aAb \]
   \[ A \rightarrow ab \]
   \[ B \rightarrow cBd \]
   \[ B \rightarrow \epsilon \]
(d) Trees

1. abbc

```
    S
   / \  / \  / \\
  a   X b   b   C
 / \  /     / \\
 e   X b   b   e
```

2. aabbbb

```
    S
   / \  / \\
  a   a b   b
 /     / \\
 X     e
```

3. aaabbbbb

```
    S
   / \  / \\
  a   a b   b
 /     / \\
 X     e
```

4. aaabbbbbcce

```
    S
   / \  / \\
  a   a b   b
 /     / \\
 X     c
```

```
    S
   / \\
 a X
 / \\
 a b
 / \\
 e
```