

**Formal Languages**  
**Chap 18: 1, 8, 9, 12**

1.

Using an indentation tree

```

S
  aS
    aaS
    aAB
    aB
      aBB
      aba
  AB
    abAB
    abB
  B
    BB
    baBB
    ba

```

8.

Another indentation tree

Top down

```

S
  A
    T
      (A)
        (T)
        (A+T)
      A+T
        T+T
          (A)+T
          A+T+T
            T+T+T
            A+T+T+T

```

Bottom up

```

(b)+b
  (T)+b
    (A)+b
      T+b
        A+b
        T+T
      (A)+T
        T+A
      (T)+T
      (A)+T

```

```

          T+T
          (A)+A
        (T)+A
          (A)+A
          (T)+S
(b)+T
  (T)+T
    (A)+T
      (S)+T
      (A)+A
    (T)+A
      (A)+A
      (T)+S
  (b)+A
    (T)+A
      (A)+A
      (T)+S
    (b)+T
      (T)+T
      (b)+A

```

9.

(a)  
 $\{a^*b^i a^i ab^+ \mid i \geq 0\}$

(b)  
 S

```

    AB
      bAaB
        baaB
          baab
            bAab

```

(c)

```

baab
  Baab
    BAab
    BaAb
    BaaB
  bAab
    Ab
      AB
        S
          BAab
          bAAb
          bAaB
        baAb
          BaAb

```

bAAb  
 baAB  
 baaB  
 BaaB  
 baAb  
 bAab

12.

I assume the author means to stop the search for certain branches, not for the whole thing. This contrasts with the current algorithm in that it prunes those branches we know cannot be derived by S

modify 2.1 to read

for each rule  $A \rightarrow w$  in P where w is not of the form  $uSv$  for some u and v, do:

(b+b)

(T+b)

(T+T)

(A+T)

(A)

T

A

S

(S+T)X

(A+A)

(S+S)X

(T+A)

(A+A)

(S+S)X

(T+S)X

(A+b)

(S+b)X

(A+T)

(S+T)X

(A+A)

(S+S)X

(b+T)

(T+T)

(A+T)

(S+T)X

(A+A)

(T+A)

(A+A)

(S+A)X

(b+A)

(T+A)

(A+A)

(T+S)X

(b+S) X