1. For each of the following trees (which are NOT Binary Search Trees!), give the PREORDER, POSTORDER, and INORDER traversals

(a) (2 points)

```
  A
 / \ 
B   C
 |   |
D   E
 |   |
F   G
```

(b) (2 points)

```
  A
 / 
B   C
 |   |
D   E
 |   |
F   G
 |   |
H   I
```

(c) (2 points)

```
  E
 / 
B   C
 |   |
A   F
 |   |
I   J
 |   |
D   G
```

2. Draw the following trees

(a) (2 points) A tree with the INORDER traversal DBECGAFG and the PREORDER traversal GBDCEAGF

(b) (2 points) A tree with the PREORDER traversal ABDECFG and the POSTORDER traversal DEBFGCA

(c) (2 points) A tree with the INORDER traversal ABIECDHFG and the POSTORDER traversal ABCDEFGHI

3. (2 points) Draw two different binary trees that have the same PREORDER and POSTORDER traversals. That is, draw two different trees $T_1$ and $T_2$ such that the PREORDER traversal of $T_1$ is the same as the PREORDER traversal of $T_2$, and the POSTORDER traversal of $T_1$ is the same as the POSTORDER traversal of $T_2$. HINT: $T_1$ and $T_2$ don’t need to be BSTs! (in fact, they can’t both be BSTs!)
4. Binary Search Trees

The shape of a Binary Search Tree is determined by the order in which elements are inserted.

(a) (1 point) Give the ordering of the elements A, B, C, and D, so that when they are inserted into an empty BST in that order they produce the following tree.

```
        D
       /\   \
      /   \  
     A     C
         /\  
        /   \ 
       B       
```

Is the ordering unique? (That is, is there any other ordering that gives the same BST?)

(b) (2 points) Give all orderings of the elements A, B, C, D that produce the following BST, when inserted in that order:

```
        C
       /\   \
      /   \  
     B     D
         /\  
        /   \ 
       A     
```

(c) For a Binary Search Tree with the following shape:

```
        o
       / \ 
      /   \ 
     o     o
    / \    / 
   /   \  /   
  o     o o     o
```

i. (2 points) Give an ordering of the elements A, B, C, D, E, F, G, H to insert into an empty tree to get that shape

ii. (1 point) Draw the resulting tree