CSCI2100C Data Structure – Quiz 2

Written Exercise sample answer

Note: You may come up with different solutions, the model answer is only for reference.

Q1

a)

```
int TreeHeight(BSTreeADT t) {
  if (BSTreeIsEmpty(t)) {
    return 0;
  }
  if (TreeHeight(LeftBSSubtree(t)) > TreeHeight(RightBSSubtree(t)))
    return TreeHeight(LeftBSSubtree(t)) + 1;
  else
    return TreeHeight(RightBSSubtree(t)) + 1;
}
```

b) n

c) $O(2^h - 1)$

d) $O(2^h)$

Q2

a) ListIsEmpty(X)

b) **true**

c) Head(Tail(X))

d) ==

e) Tail(Tail(X))

```
bool Fn1(listADT X) {
  if (ListIsEmpty(X) ) return true;
  if (ListIsEmpty(Tail(X))) return true ;
  if ( Head(Tail(X)) % 2 == 0) return false;
  return Fn1( Tail(Tail(X)) );
}
```

f) 0 or 1

g) $\frac{m}{2} + 1$

h) $O(1)$

i) $O(m)$

j) $O(m)$

Q3

a)

```
bool ListIsEmpty(listADT L) {
  return QueueIsEmpty(L->Q);
}
```

b) Dequeue(L->Q)
c) L->Q
d) Dequeue(L->Q)
e) tmp
f) v->Q

Q4

a) ListIsEmpty(L1)
b) ListIsEmpty(X1)
c) return 0
d) Tail(X1)
e)

```
int isExtension(listADT L1, listADT L2) {
   if (ListIsEmpty(L1)) return 1;
   if (ListIsEmpty(L2)) return 0;
   if (Head(L1) != Head(L2)) return 0;
   return isExtension(Tail(L1), Tail(L2));
}
```

f) EmptyList() or []
g) EmptyList() or []
h) Cons(1, EmptyList()) or [1]
i) [-1, 1, 1, -1]

Q5 (10 marks)

5 1 2 8 4 7 3 6 3 9

9 1 2 8 4 7 3 6 3 5

9 8 2 1 4 7 3 6 3 5

9 8 7 1 4 2 3 6 3 5

9 8 7 6 4 2 3 1 3 5

9 8 7 6 5 2 3 1 3 4

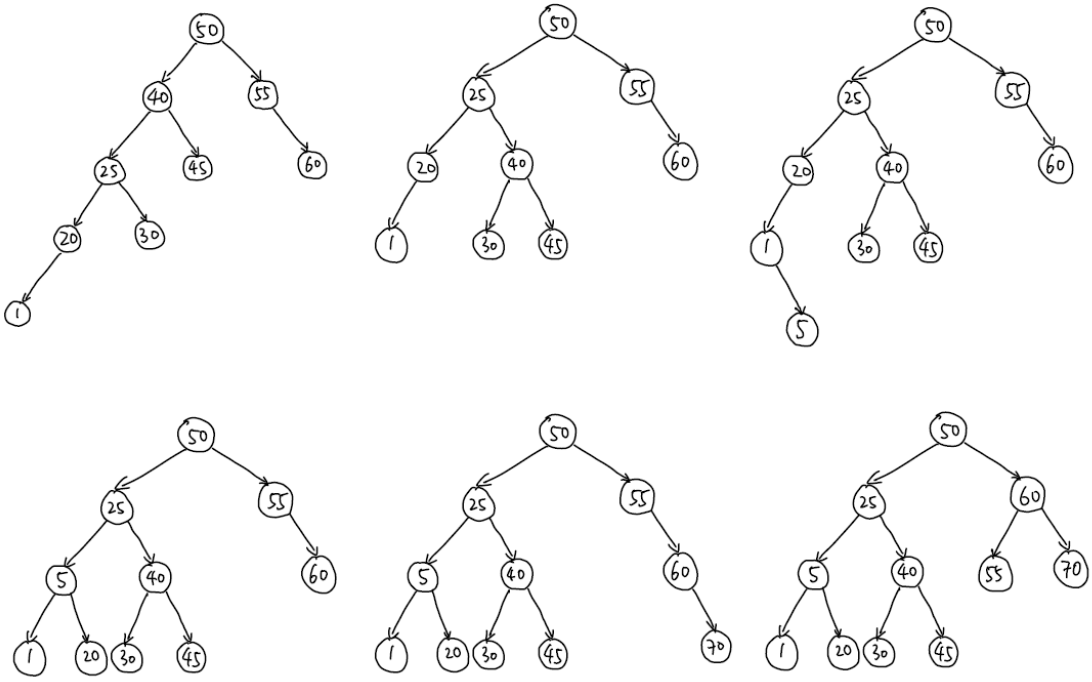
9 8 7 6 5 4 3 1 3 2

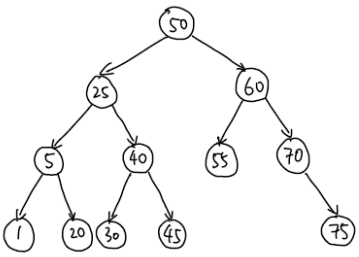
9 8 7 6 5 4 3 1 3 2

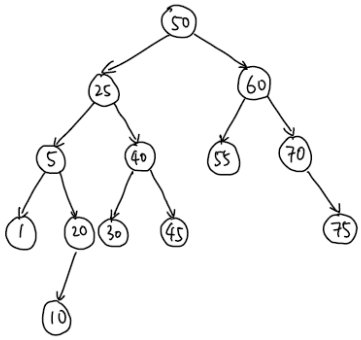
9 8 7 6 5 4 3 3 1 2

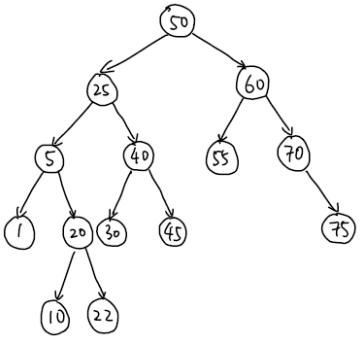
9 8 7 6 5 4 3 3 2 1

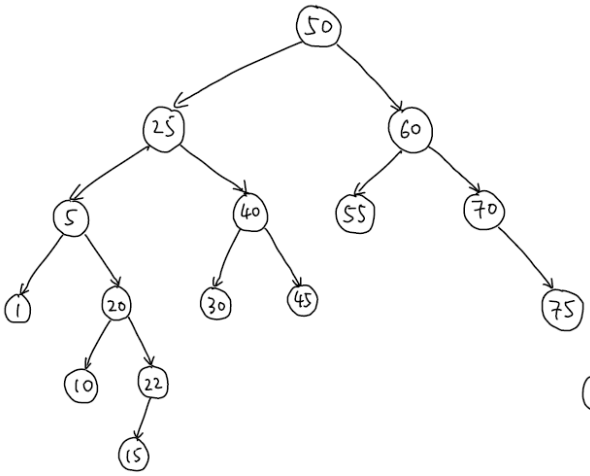
Q6

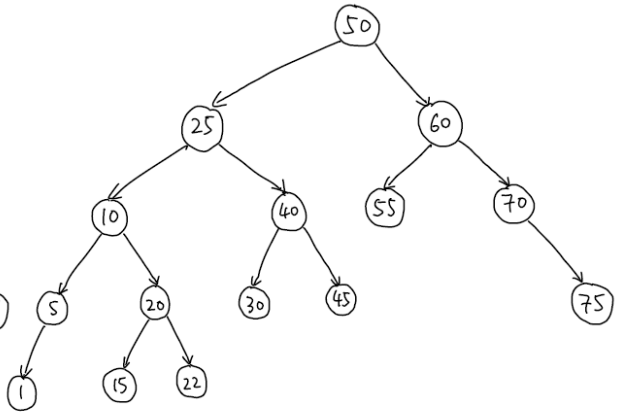


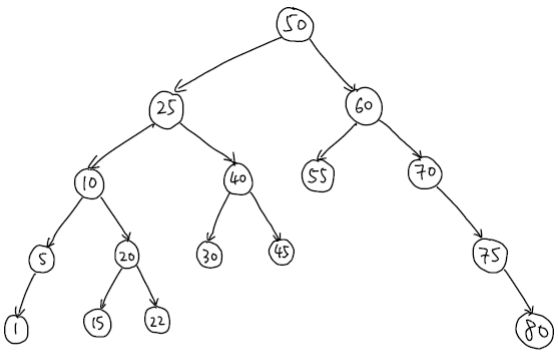

50
25
60
5
40
55
70
1
20
30
45
75

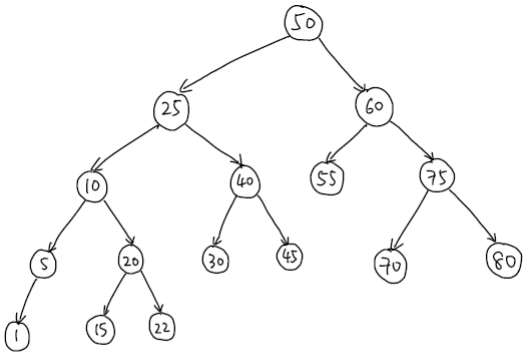

50
25
60
5
40
55
70
1
20
30
45
75
10

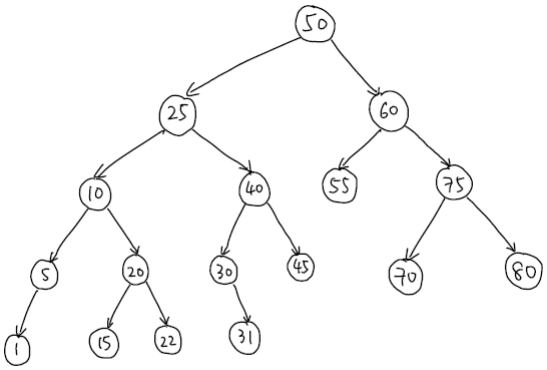

50
25
60
5
40
55
70
1
20
30
45
75
10
22

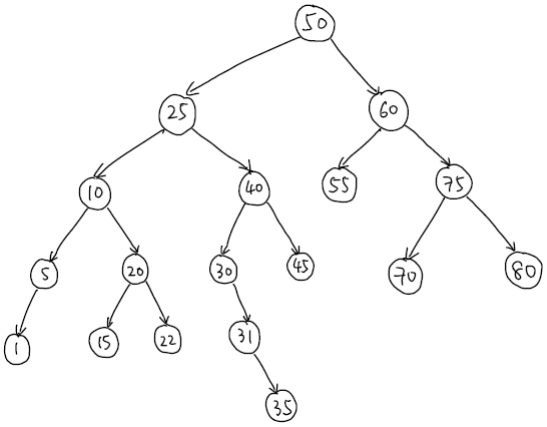

50
25
60
5
40
55
70
1
20
30
45
75
10
22
15

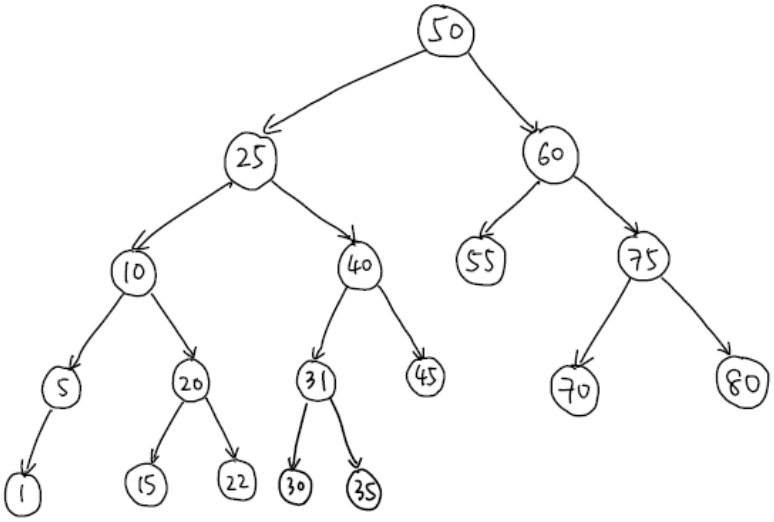

50
25
60
10
40
55
70
5
20
30
45
75
1
15
22


50
25
60
10
40
55
70
5
20
30
45
75
1
15
22
80


50
25
60
10
40
55
75
5
20
30
45
70
80
1
15
22


50
25
60
10
40
55
75
5
20
30
45
70
80
1
15
22
31


50
25
60
10
40
55
75
5
20
30
45
70
80
1
15
22
31
35


50
25
60
10
40
55
75
5
20
31
45
70
80
1
15
22
30
35