Karadeniz Technical University
Department of Computer Engineering
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COM 2005 Data Structures
Final Exam, 04.01.2020, 10:00
Duration : **100** Minutes

NUMBER : .... **NAME :** ....

SIGNATURE : ....

EXAM GRADE	
[........]	....

Students have to obey Engineering Faculty Exam Execution Instructions.
Questions are related to 1,4,12 of Program Learning Outcomes

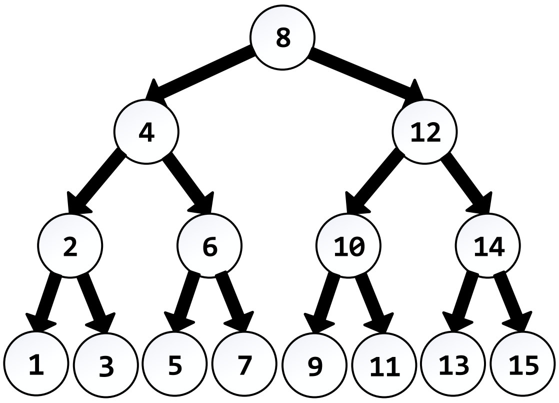
```
void traverse(TreeNode* v)
{
     if (v->left != NULL)
     {
          // (A)
          traverse(v->left);
          // (B)
     }

     if (v->right != NULL)
     {
          // (C)
          traverse(v->right);
          // (D)
     }
}
```

1. Some lines are labeled as **(A) (B) (C) (D)** in the function **traverse()** above. Assuming these lines are like **cout << v->elem << " ";** two of the outputs will be same. Which outputs are same and what is the output? **(25P)**

(A)	(B)	(C)	(D)

Output



2. Assume that numbers of each choice are inserted into a seperate binary tree. In this case one tree is different from others. Which is the different one? **(25P)**

(A)	8 4 12 2 6 10 14 1 3 5 7 9 11 13 15
(B)	8 12 4 14 10 6 2 15 13 11 9 7 5 3 1
(C)	8 4 2 1 3 6 5 7 12 10 9 11 14 13 15
(D)	8 4 6 7 5 2 3 1 12 14 15 13 10 11 9
(E)	8 12 10 14 9 11 13 15 4 2 6 1 3 5 7
(F)	8 4 2 6 1 3 5 7 12 10 14 9 11 13 15
(G)	8 12 4 2 3 1 10 9 11 6 5 7 14 15 13
(H)	8 4 12 2 6 7 5 3 1 14 10 15 13 11 9
(I)	8 12 4 2 3 1 10 9 11 6 5 7 13 15 14
(J)	8 12 4 2 10 14 6 7 5 15 13 9 11 1 3

```
void insertOrdered(string& e, int& i)
{
   DoublyNode* newNode    = new DoublyNode;
   newNode->elem          = e;
   newNode->score         = i;

   DoublyNode* current = header->next;

   while (current != trailer)
   {
       if (newNode->score >= current->score)
             current = current->next;
       else
             break;
   }

   newNode->next    = current;
   newNode->prev    = current->prev;
   ............... = ...............;
   ............... = ...............;
}
```

3. Considering the two lines of the **insertOrdered()** function that are indicated by "**.....**", which of the following choises add a node to a doubly linked list erroneously? **(25P)** *You'll loose **5P** from wrong answer.*

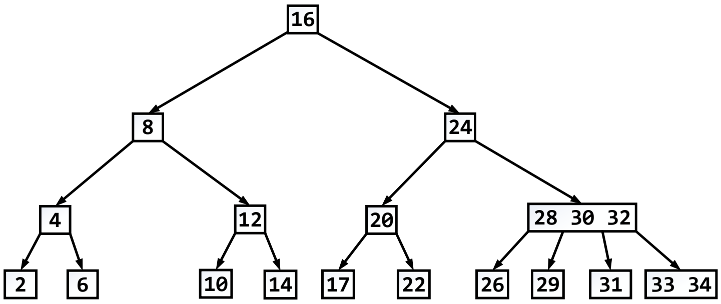
```
(A)   current->prev->next     = newNode;
      newNode->next->prev     = newNode;

(B)   newNode->next->prev     = newNode;
      current->prev->next     = newNode;

(C)   current->prev->next     = newNode;
      current->prev           = newNode;

(D)   newNode->prev->next     = newNode;
      newNode->next->prev     = newNode;

(E)   newNode->next->prev     = newNode;
      newNode->prev->next     = newNode;
```



4. Delete **16** from **2-3-4** tree above. After deletion draw the whole tree.
Hint → Replace **17** with **16**. **(25P)**