



NUMBER :

NAME :

EXAM GRADE

SIGNATURE :

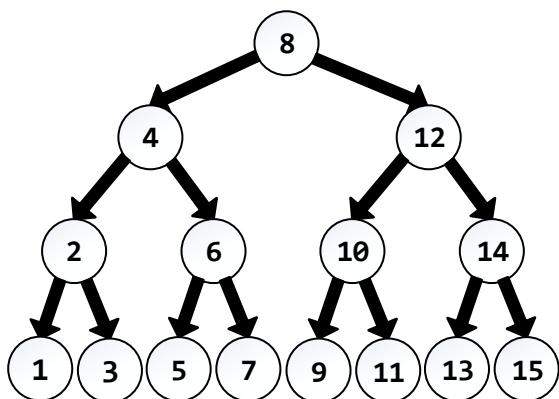
[.....]

Students have to obey [Engineering Faculty Exam Execution Instructions](#).

Brief information about the exam will be given at the begining, then no one is allowed to ask a question during the exam.

```
void traverse(Node* v)
{
    if (v->left != NULL)
        traverse(v->left);
    else
        if (v->right == NULL)
            cout << v->elt << " ";
        if (v->right != NULL)
            traverse(v->right);
}
```

1. What is the output of the function **traverse()** that is called in the **main()** with the **root** of the tree below? (25P)



```
void traverse(Node* v)
{
    stack<Node*> stl_stack;
    stl_stack.push(v);

    while (!stl_stack.empty())
    {
        Node* current = stl_stack.top();
        cout << current->elt << " ";

        stl_stack.pop();

        if (current->right != NULL)
            stl_stack.push(current->right);

        if (current->left != NULL)
            stl_stack.push(current->left);
    }
}
```

2. What is the output of the function **traverse()** that is called in the **main()** with the **root** of the tree on the left? (25P)

```

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

    DoublyNode* current = header;

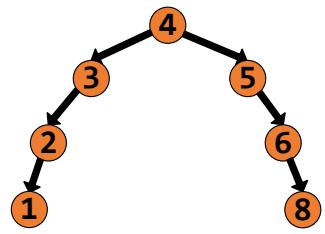
    while (current->next != trailer)
    {
        if(newNode->score >= current->next->score)
            current = current->next;
        else
            break;
    }

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

int main()
{
    DoublyLinkedList list;
    list.insertOrdered("Paul", 720);
    list.insertOrdered("Rose", 590);
    list.insertOrdered("Anna", 660);
    list.insertOrdered("Mike", 1105);
    list.insertOrdered("Rob", 750);
    list.insertOrdered("Jack", 510);
    list.insertOrdered("Jill", 740);
}

```

Zig	(X:Left)
Zig-Zig	(X:Right, P:Right)
Zig-Zag	(X:Right, P:Left)
Zig	(X:Left)
Zig-Zag	(X:Right, P:Left)
Zig-Zig	(X:Left, P:Left)
Zig-Zig	(X:Right, P:Right)
Zig-Zag	(X:Right, P:Left)



4. Find the element insertion order for the Splay Tree above using splay operations in the table. (25P)



3. Considering the two lines of the `insertOrdered()` function that are indicated by "....", which of the following choices add a node to a doubly linked list erroneously? (25P)

You'll lose 5P from wrong answer.

- (A) `newNode->prev->next = newNode;`
`newNode->next->prev = newNode;`
- (B) `newNode->next->prev = newNode;`
`newNode->prev->next = newNode;`
- (C) `current->next = newNode;`
`current->next->next->prev = newNode;`
- (D) `current->next = newNode;`
`newNode->next->prev = newNode;`
- (E) `current->next = newNode;`
`current->next->prev = newNode;`