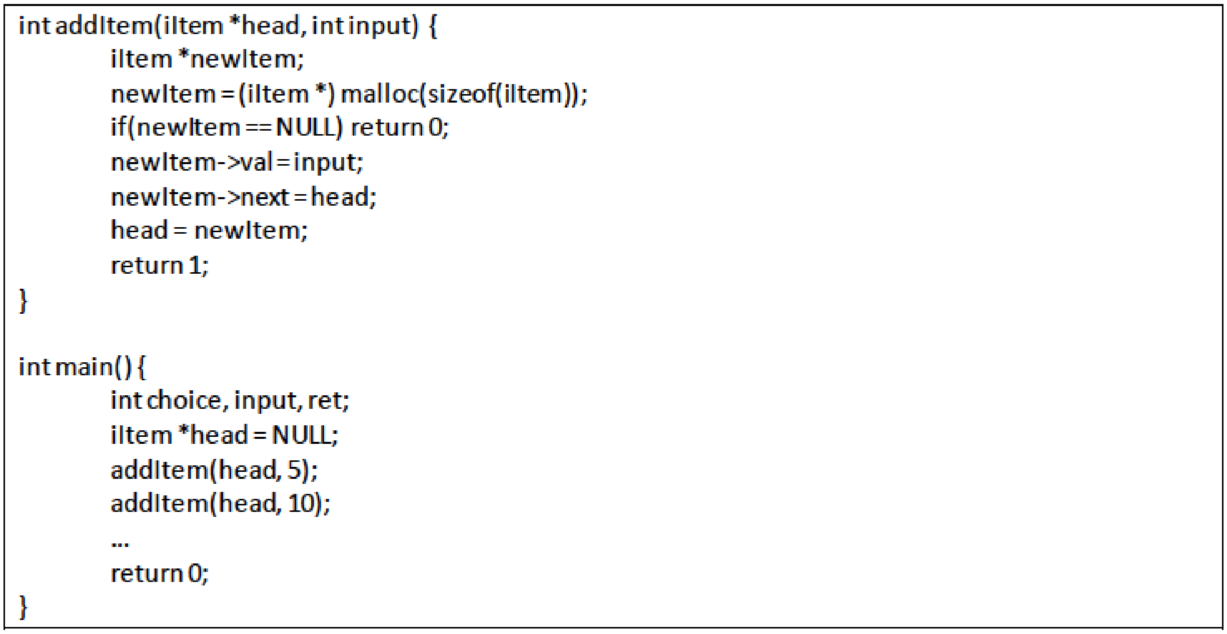
Concept Practice Questions:

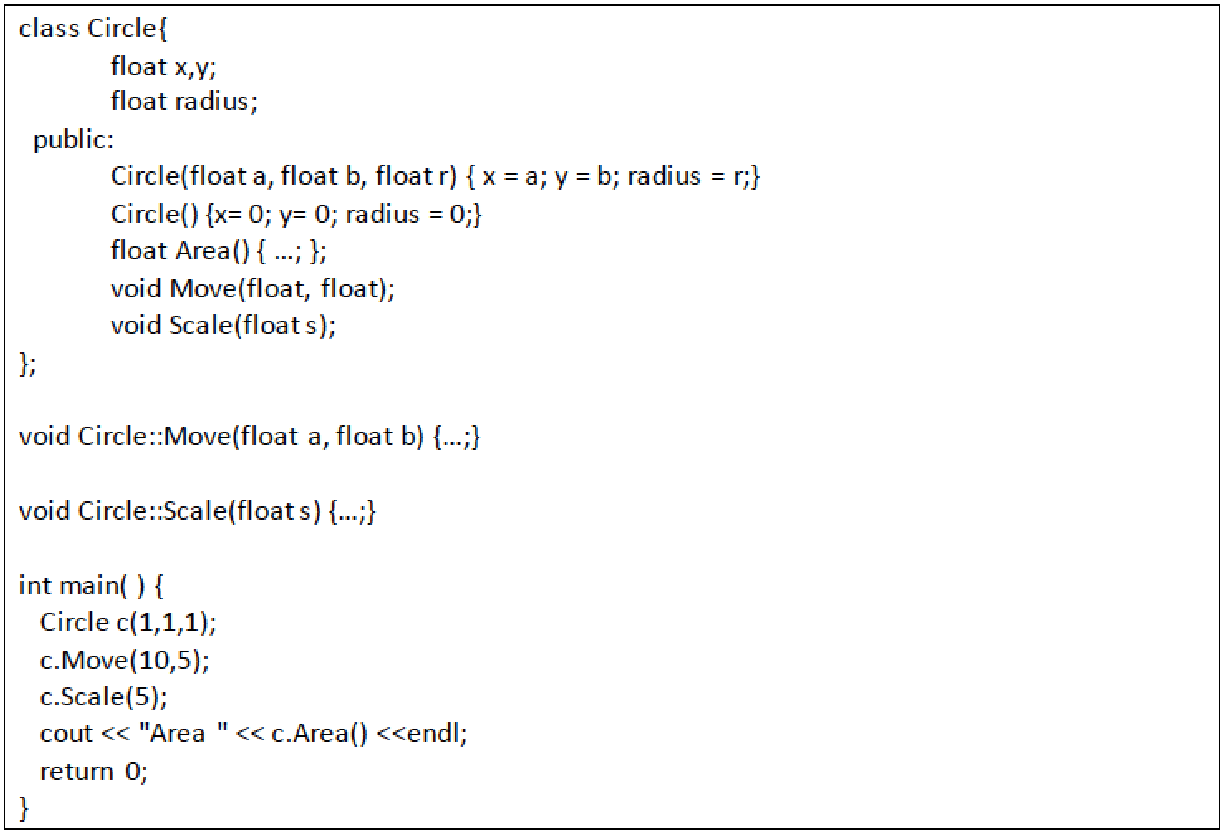
Q1. The following code is supposed to insert two nodes in a linked list (with a single integer member called val and a next pointer). A) Explain why this does notwork. B) Rewrite the lines with changes to fix the bugs.



```
int addItem(iItem *head, int input) {
        iItem *newItem;
        newItem = (iItem *) malloc(sizeof(iItem));
        if(newItem == NULL) return 0;
        newItem->val = input;
        newItem->next = head;
        head = newItem;
        return 1;
}

int main() {
        int choice, input, ret;
        iItem *head = NULL;
        addItem(head, 5);
        addItem(head, 10);
        ...
        return 0;
}
```

Q2. Explain **encapsulation** (scope and visibility of members) in object oriented programming with the following partial example. Which members of the class Circle are accessible from where? Does this depend on where in the program the object of the class is declared?



```
class Circle{
          float x,y;
          float radius;
  public:
          Circle(float a, float b, float r) { x = a; y = b; radius = r;}
          Circle() {x= 0; y= 0; radius = 0;}
          float Area() { ...; };
          void Move(float, float);
          void Scale(float s);
};

void Circle::Move(float a, float b) {...;}

void Circle::Scale(float s) {...;}

int main( ) {
  Circle c(1,1,1);
  c.Move(10,5);
  c.Scale(5);
  cout << "Area " << c.Area() <<endl;
  return 0;
}
```

Q3. For a nested subroutine in LC-3, register ___________ must be caller-saved / callee-saved (choose one).

Q4. Is the following tree a binary search tree? Explain your reason.