COSC 2436

EXAM 1 REVIEW

Find the output for the following program if x = 16

```
void func(int x){
  if(x == 4){
    cout << "found" << endl;
    return;
  }
  else if(x % 2 == 0){
    cout << x << endl;
    func(x / 2);
  }
  else{
    func(x + 1);
  }
}
```

Find the output for the following program if x = 16

```
void func(int x){
    if(x == 4){
        cout << "found" << endl;
        return;
    }
    else if(x % 2 == 0){
        cout << x << endl;
        func(x / 2);
    }
    else{
        func(x + 1);
    }
}
```

16
8
found

Given a positive integer, write a recursive function to find the sum of its digits.

Given a positive integer, write a recursive function to find the sum of its digits.

```
int sumOfDigits(int n){
    if(n < 10){
        return n;
    }
    return (n % 10 + sumOfDigits(n / 10));
}
```

You are climbing a staircase that takes *n* steps to reach the top. Each time you can either climb 1 or 2 steps. Write a recursive function to return how many distinct ways you can climb to the top.

You are climbing a staircase that takes *n* steps to reach the top. Each time you can either climb 1 or 2 steps. Write a recursive function to return how many distinct ways you can climb to the top.

```
int climbStairs(int n){
  if(n < 0){
    return 0;
  }
  else if(n == 0){
    return 1;
  }
  return climbStairs(n-1) + climbStairs(n-2);
}
```

What is the time complexity of the following function?

```
void printFunction(int arr[], int n){
    for(int i = 0; i < n; i++){
        cout << arr[i] << endl;
    }
    for(int j = 0; j < n; j++){
        cout << arr[j] << endl;
    }
}
```

$$O(2n) \Rightarrow O(n)$$

Know the best, average, and worst time complexities for bubble, selection, and insertion sort.

Write a function to delete the first occurrence of a certain value from a linked list.

```
void deleteValue(int v){
  if(head == nullptr){
    return;
  }
  node *cu = head;
  node *prev = nullptr;
  while(cu != nullptr){
    if(cu->value == v){
      node *temp = cu;
      if(cu == head){
        head = head->next;
      }
      else{
        prev->next = cu->next;
      }
      delete temp;
    }
    prev = cu;
    cu = cu->next;
  }
}
```

Write a function to find the length of a linked list.

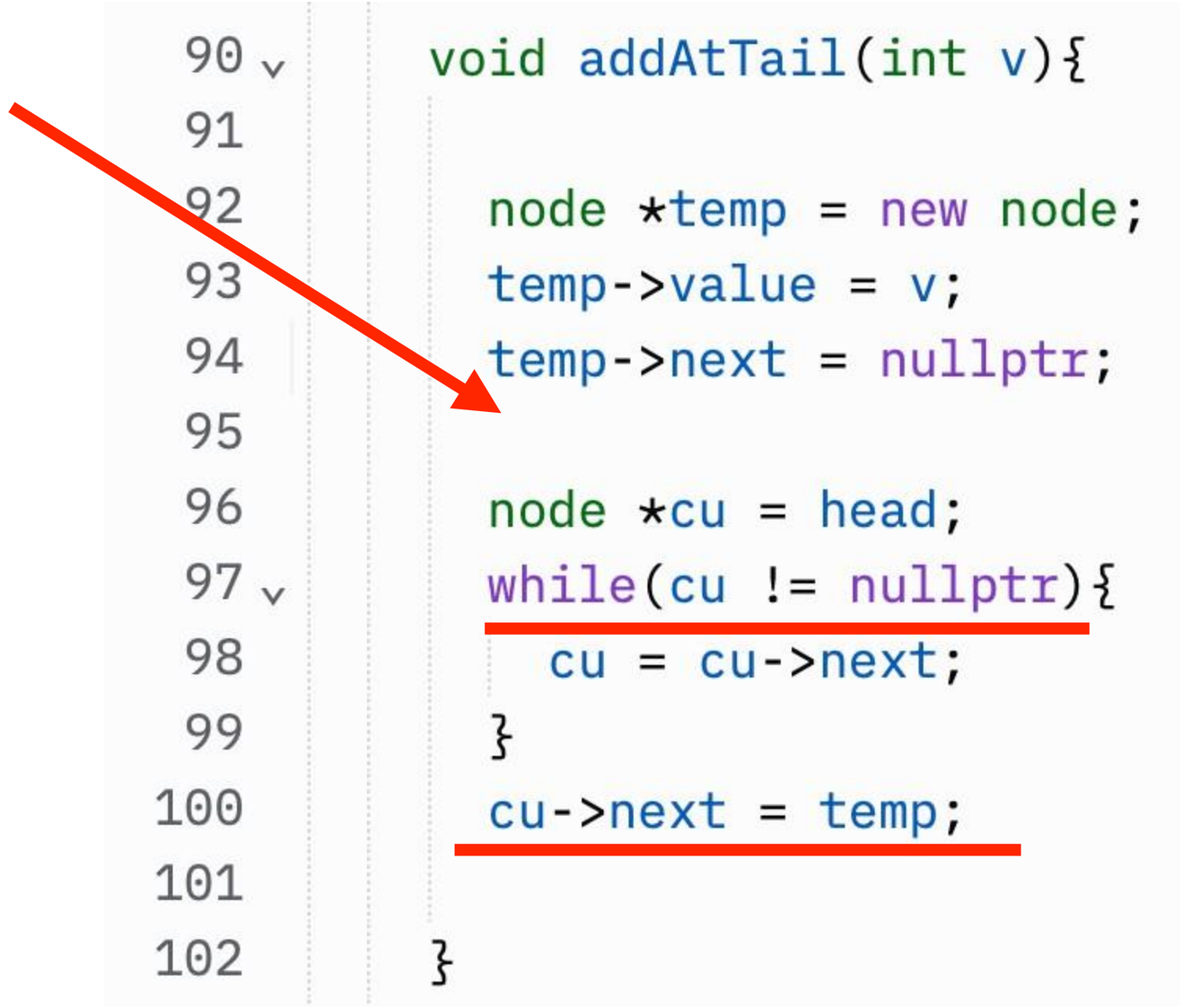
```
int getLength(){
    int len = 0;
    node *cu = head;;
    while(cu != nullptr){
        len++;
        cu = cu->next;
    }
    return len;
}
```

This function tries to add at the tail of a linked list. What is wrong with it?

```
90  void addAtTail(int v){
91
92      node *temp = new node;
93      temp->value = v;
94      temp->next = nullptr;
95
96      node *cu = head;
97      while(cu != nullptr){
98          cu = cu->next;
99      }
100     cu->next = temp;
101
102 }
```

1)It does not have an if statement to check if head == nullptr

2) A segmentation fault occurs because on line 100, cu is nullptr but it tries to access its next pointer.



```
90  void addAtTail(int v){
91
92      node *temp = new node;
93      temp->value = v;
94      temp->next = nullptr;
95
96      node *cu = head;
97      while(cu != nullptr){
98          cu = cu->next;
99      }
100     cu->next = temp;
101
102 }
```

Here is the correct function:

```
90  void addAtTail(int v){
91
92      node *temp = new node;
93      temp->value = v;
94      temp->next = nullptr;
95      if(head == nullptr){
96          head = temp;
97          return;
98      }
99
100     node *cu = head;
101     while(cu->next != nullptr){
102         cu = cu->next;
103     }
104     cu->next = temp;
105
106 }
```

Trace the following array using selection sort.

Array = {3, 1, 2, 5, 4}

Start: 3, 1, 2, 5, 4

1, 3, 2, 5, 4

1, 2, 3, 5, 4

End: 1, 2, 3, 4, 5

Know how to code bubble, insertion, and selection sort.