

Question 1

1. What function would you use to join an element onto the end of a list? (1 mark)
2. Assuming `l` is long enough, what expression involving `hd` and `tl` would give the 3rd element of the list `l`? (1 mark)
3. Assuming `l1`, `l2` and `l3` are lists, what expression could be used to join the lists together? Note that `l1` should come before `l2` which should be before `l3`. (1 mark)

Please write your answers here:

1. `append`
2. `hd(tl(tl(l)))`
3. `append(l1,append(l2,l3))` or `append(append(l1,l2),l3)`

Question 2

If `l1` has length 3, how long is the list returned by calling `append(l1, l1)`?

☐ 3

☐ 0

☐ 4

☐ 1

☒ 6

Question 3

Look at the following code:

```
String f(char c, String s) {  
    String to_return = "";  
    while(true) {  
        if(s.equals("")) return to_return;  
        // at this point s is not ""  
        char c2 = s.charAt(0);  
        if(c2!=c) { to_return += c2; }  
        s=s.substring(1);  
    }  
}
```

What is the result of calling `f('l', "hello")`?

☐ true

☐ false

☐ helo

☐ hello

☒ heo

☐ ll

Question 4

Look at the following code:

```
List g(int i, List l) {
    List to_return = nil();
    while(true) {
        if(l.isEmpty()) return append1(to_return,i);
        Integer j = (Integer)(hd(l));
        if(i < j) {
            to_return=append1(to_return,i);
            to_return=append(to_return,l);
            return to_return;
        }
        // i >= hd(l)
        to_return=append1(to_return,j);
        l=tl(l);
    }
}
```

What is the result of calling `g(3,[1,2,4,5])`?

☐ [1,2,4,5]

☐ [1,2,3]

☐ [1,2,4,5,3]

☐ [1,2,4]

☒ [1,2,3,4,5]

Question 5

Look at the following code:

```
List hh(List l) {  
    if(l.isEmpty()) return l;  
    int i = (Integer)(hd(l));  
    List to_return = cons(i,nil());  
    l=tl(l);  
    while(true) {  
        if(l.isEmpty()) return to_return;  
        int j = (Integer)(hd(l));  
        if(i<j) to_return = append1(to_return,j);  
        i=j;  
        l=tl(l);  
    }  
}
```

What is the result of calling hh([1,4,3,5,4,1,2]) ?

☐ [1,4,3,5,4,1,2]

☐ [4,3,5,4,1,2]

☒ [1,4,5,2]

☐ [1,4,5,1,2]

☐ [4,5,2]

☐ [4,5,1,2]

Question 6

Look at the following code:

```
public String mn(String s) {
    String to_return="";
    String str = "";
    while(true) {
        if(s.equals("")) return to_return;
        char c = s.charAt(0);
        if(c == ' ') {
            to_return = to_return+str+' ';
            str="";
        } else {
            str=c+str+c;
        }
        s=s.substring(1);
    }
}
```

What is the result of calling mn("a bc def")?

☐ "aa cbbc feddef"

☐ "a bc fed"

☐ "fed cb a"

☒ "aa cbbc "

☐ "abcdef"

Question 7

Look at the following code:

```
boolean pq(String s1, String s2) {  
    while(true) {  
        if(s1.equals("")) return true;  
        if(s2.equals("")) return false;  
        if(s1.charAt(0)!=s2.charAt(0)) return false;  
        s1=s1.substring(1);  
        s2=s2.substring(1);  
    }  
}
```

What is the result of calling `pq("tomc","tomab")`?

☐ true

☒ false

☐ An exception is thrown

☐ The program fails to compile

☐ Something else

Question 8

Look at the following code:

```
public List uv(List l, int n) {  
    List to_return = nil();  
    while(true) {  
        if(l.isEmpty()) return to_return;  
        Integer i = (Integer)(hd(l));  
        if(i<n) { to_return = append1(to_return,i); }  
        l=tl(l);  
    }  
}
```

What is the result of calling `uv([1,9,2,8,4,3],8)`?

☐ [1,2,3,4]

☐ [1,2,3,4,8]

☐ [1,2,3,4,8,9]

☒ [1,2,4,3]

☐ [1,2,4,3,8]

Question 9

Look at the following code:

```
List wx(List l1, List l2) {  
    List to_return = nil();  
    while(true) {  
        if(l1.isEmpty()) return append(to_return,l2);  
        if(l2.isEmpty()) return append(to_return,l1);  
        to_return = append1(to_return,hd(l1));  
        to_return = append1(to_return,hd(l2));  
        l1 = tl(l1);  
        l2 = tl(l2);  
    }  
}
```

What is the result of calling `wx([1,3,5],[6,4,2,0,-2])`?

☒ `[1, 6, 3, 4, 5, 2, 0, -2]`

☐ `[1, 6, 3, 4, 5, 2]`

☐ `[1, 3, 5, 6, 4, 2, 0, -2]`

☐ `[-2, 0, 1, 2, 3, 4, 5, 6]`

☐ Something else

Question 10

Look at the following code:

```
List yz(Integer i, List l) {
    List to_return = nil();
    while(true) {
        if(l.isEmpty()) return append1(to_return,i);
        Integer j = (Integer)(hd(l));
        if(i>j) {
            to_return=append1(to_return,i);
            return append(to_return,l);
        }
        to_return=append1(to_return,j);
        l=tl(l);
    }
}

List ya(List l) {
    List to_return = nil();
    while(true) {
        if(l.isEmpty()) return to_return;
        to_return = yz( (Integer)(hd(l)), to_return);
        l=tl(l);
    }
}
```

What is the result of calling ya([3,5,4,1,2])?

☐ [1, 2, 3, 4, 5]

☐ [2, 1, 4, 5, 3]

☒ [5, 4, 3, 2, 1]

☐ []

☐ Something else
