

# CSC 209 Review 8 Solution

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```
1  int *my_malloc (int n) {
2      int *res;
3
4      res = malloc(n * sizeof(int));
5      if (res == NULL) {
6          perror("Allocation failed.");
7      }
8
9      return res;
10 }
```

Please see question\_1.c for details.

```
2  char *duplicate(char *str) {
3      char *res;
4
5      res = malloc(strlen(str) + 1);
6      if (res == NULL) {
7          return res;
8      }
9
10     strcpy(res, str);
11
12     return res;
13 }
```

Please see question\_2.c for details.

```
3  int *create_array(int n, int initial_value) {
4      int *p, *res;
5
6      res = malloc(n * sizeof(int));
7
8      if (res == NULL) {
9          return res;
10     }
11 }
```

```
10     for (p = res; p < res + n; p++) {
11         *p = initial_value;
12     }
13
14     return res;
15 }
```

Please see `question_3.c` for details.

```
41 int main(void) {
2     struct point {int x, y};
3     struct rectangle {struct point upper_left, lower_right};
4     struct rectangle *p;
5
6     p = malloc(sizeof(struct rectangle));
7
8     p->upper_left.x = 10;
9     p->upper_left.y = 25;
10
11     p->lower_right.x = 20;
12     p->lower_right.y = 15;
13
14     printf("%d %d\n", p->upper_left.x, p->upper_left.y);
15     printf("%d %d\n", p->lower_right.x, p->lower_right.y);
16
17     free(p);
18
19     return 0;
20 }
21
22
```

Please see `question_4.c` for details.

5. b), c) and d) are legal.

### Correct Solution

b), c) are legal.

### Notes

- **The -> Operator**

- doesn't carry over to accessing nested members. Only works when struct is a pointer

#### Example

`p->upper_left.x`

```

61 struct node *delete_from_list(struct node *list, int n)
2   {
3       struct node *cur = list, *temp;
4
5       if (cur->value == n) {
6           list = cur->next;
7           return list;
8       }
9
10      for (cur = list; cur != NULL; cur = cur->next) {
11
12          if (cur->next != NULL && cur->next->value == n) {
13              break;
14          }
15      }
16
17      if (cur == NULL) {
18          return list;
19      }
20
21      temp = cur->next;
22      cur->next = cur->next->next;
23
24      free(temp);
25      return list;
26  }

```

7. It's incorrect because it's deleting the node before moving to next.

To fix this bug, p must move to the next node before removing the current.

```

1   struct node *temp;
2   p = first;
3   while (p != NULL) {
4       temp = p;
5       p = p->next
6       remove(temp);
7   }

```

8. Please see file `question_8/stack.h`, `question_8/stack.c`, `question_8/calc.c` for details.

9. True.

By definition,  $(\&x) \rightarrow a$  is the same as  $(*(\&x)).a$ .

Since  $(*(\&x)) = x$ , we can write  $(\&x) \rightarrow a$  is the same as  $x.a$ .

```

101 void print_part(struct part *p)
2   {
3       printf("Part number: %d\n", p->number);
4       printf("Part name: %s\n", p->name);
5       printf("Quantity on hand: %d\n", p->on_hand);
6   }

```

11. Please see `question_11.c` for details.

```
121 struct node {
2     int value;
3     struct node *next;
4 };
5
6 struct node *find_last(struct node *list, int n)
7 {
8     struct node *res = NULL, *p;
9
10    for (p = list; p != NULL; p = p->next) {
11        if (p->value == n) {
12            res = p;
13        }
14    }
15
16    return res;
17 }
```

Please see file `question_12.c` for details.

```
131 struct node {
2     int value;
3     struct node *next;
4 };
5
6 struct node *insert_into_ordered_list(struct node *list, struct node
*new_node)
7 {
8     struct node *cur = list, *prev = NULL;
9
10    if (list == NULL) {
11        list = new_node;
12        return list;
13    }
14
15    while (cur != NULL && cur->value <= new_node->value) {
16        prev = cur;
17        cur = cur->next;
18    }
19
20    prev->next = new_node;
21    new_node->next = cur;
22    return list;
23 }
```

```
141 struct node *delete_from_list(struct node **list, int n)
2 {
3     struct node *cur, *prev;
4
5     for (cur = *list, prev = NULL;
6         cur != NULL && cur->value != n;
```

```

7         prev = cur, cur = cur->next)
8
9         ;
10
11     if (cur == NULL) {
12         return (*list);
13     }
14
15     if (prev == NULL) {
16         *list = (*list)->next;
17     } else {
18         prev->next = cur->next;
19     }
20
21     free(cur);
22     return (*list);
23 }

```

Please see question\_14.c for details.

15. It returns the value of  $n$  that is equal to  $i * i + i - 12$ .

Here, the value of  $n$  is 3.

Please see question\_15.c for details.

```

16_1 int sum(int (*f)(int), int start, int end)
17_2 {
18_3     int res = 0;
19_4     for (int i = start; i <= end; i++) {
20_5         res += (*f)(i);
21_6     }
22_7
23_8     return res;
24_9 }

```

Please see question\_16.c for details.

```

17_1 qsort(&a[50], 50, sizeof(a[0]), compare_parts);

```

```

18_1 int compare_parts(const void *p, const void *q)
19_2 {
20_3     return ((struct part *) q)->number - ((struct part *) p)->number
21_4 ;
22_5 }

```

```

19_1 struct {
20_2     char *cmd_name;
21_3     void (*cmd_pointer)(void);
22_4 };

```