

CSC 209 Review 8 Solution

September 12, 2020

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

```
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  
7 *new_node)  
8 {  
9     struct node *cur = list, *prev = NULL;  
10  
11    if (list == NULL) {  
12        list = new_node;  
13        return list;  
14    }  
15  
16    while (cur != NULL && cur->value <= new_node->value) {  
17        prev = cur;  
18        cur = cur->next;  
19    }  
20  
21    prev->next = new_node;  
22    new_node->next = cur;  
23    return list;  
24 }
```

```
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)
2     {
3         int res = 0;
4         for (int i = start; i <= end; i++) {
5             res += (*f)(i);
6         }
7
8         return res;
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)
2     {
3         return ((struct part *) q)->number - ((struct part *) p)->number
4     }

```

```

19_1 struct {
2     char *cd_name;
3     void (*cmd_pointer)(void);
4 } file_cmd[] = {

```

```
5     {"new", new_cmd},
6     {"open", open_cmd},
7     {"close", close_cmd},
8     {"close all", close_all_cmd},
9     {"save", save_cmd},
10    {"save as", save_as_cmd},
11    {"save all", save_all_cmd},
12    {"print", print_cmd},
13    {"exit", exit_cmd}
14 } ;
15
16
17 void run_cmd(const char *cmd)
18 {
19     int cmd_cnt = sizeof(file_cmd)/sizeof(file_cmd[0]);
20     char cmd_cpy[21], *p;
21
22     strcpy(cmd_cpy, cmd);
23     if (strlen(cmd) == 21) {
24         cmd_cpy[20] = '\\0';
25     }
26
27     for (p = cmd_cpy; *p != '\\0'; p++)
28     {
29         *p = tolower(*p);
30     }
31
32     for (int i = 0; i < cmd_cnt; i++) {
33         if (strcmp((file_cmd[i]).cmd_name, cmd_cpy) == 0) {
34             return (file_cmd[i]).cmd_pointer();
35         }
36     }
37 }
38
39 void new_cmd(void)
40 {
41     printf("new_cmd\\n");
42 }
43 void open_cmd(void)
44 {
45     printf("open_cmd\\n");
46 }
47 void close_cmd(void)
48 {
49     printf("close_cmd\\n");
50 }
51 void close_all_cmd(void)
52 {
53     printf("close_all_cmd\\n");
54 }
55 void save_cmd(void)
56 {
57     printf("save_cmd\\n");
58 }
```

```
59 void save_as_cmd(void)
60 {
61     printf("save_as_cmd\n");
62 }
63 void save_all_cmd(void)
64 {
65     printf("save_all_cmd\n");
66 }
67 void print_cmd(void)
68 {
69     printf("print_cmd\n");
70 }
71 void exit_cmd(void)
72 {
73     printf("exit_cmd\n");
74 }
```

Please see `question_19.c` for details.

20. Please see `question_20.c` for details.

21. Please see `question_21.c` for details.

Notes

- `qsort`
 - is a part of `<stdlib>` library

22. Please see `question_22.c` for details

23. Please see `question_23.c` for details

Notes

- Always include `NULL`

24. Please see `question_24.c` for details