

CSC 209 Review 6 Solution

August 24, 2020

1 Exercises

1. I need to write which of the supplied function calls don't work and explain why.

- b) String format in `printf` expects character constant, but string literal is used
- c) String format in `printf` expects string but character constant is used
- e) The first argument in `printf` expects pointer but character constant (an integer) is used instead
- h) The first argument in `putchar` expects a character, but string literal (a pointer to character) is used
- i) The first argument in `puts` expects a pointer to character, but character constant (an integer) is used

Notes

- **putchar**
 - **Syntax:** `int putchar(int char)`
 - Writes a character (an unsigned char) specified by the argument `char` to stdout.
 - Does not append a new line to the output
 - Is similar to `printf` but for character
- **puts**
 - **Syntax:** `int puts(const char *str)`
 - Writes a string to stdout up to but not including the null character
 - Appends a newline character to the output.
 - Is similar to `printf` but for string
- **Character Constant**
 - **Syntax:** `' ... '`

- Is represented by an integer

- **String Literal**

- **Syntax:** " . . . "
- Has a sequence of characters inside
- Ends with `\0`
- Is represented by a pointer

Example

"When you come to a fork in the road, take it"

- **Escape Sequences in String Literal**

- A common example is `'\n'`
 - * causes the cursor to advance to the next line

2. First, I need to write which of the provided function calls are legal, and write the output produced

The solution to the first part is:

- b) [output: a]
- c) [output: abc]

Second, I need to write which of the following function calls are illegal, and explain why.

The solution to the second part is:

- a) `purchar` expects a character constant (an integer) but a value of type pointer to `char` is used
- d) `puts` expects a variable of type pointer to `char`, but a variable of type pointer to `char` is used

3. I need to write the values of `i`, `j`, `k` in the function

```
scanf("%d%s%d", &i, s, &j)
```

if the user enters `12abc34 56def78`.

The solution to this problem is:

- `i` - 12
- `j` - abc34

- k - 56

4. I need to modify the following `read_line` function in the following ways:

```
int read_line(char str[], int n)
{
    int ch, i = 0;

    while ((ch = getchar()) != '\n')
        if (i < n)
            str[i++] = ch;
    str[i] = '\0';
    return i;
}
```

- Have it skip white space before beginning to store input characters
- Have it stop reading at the first white-space character
- Have it stop reading at the first new-line character, then store the new-line character in the string
- Have it leave behind characters that it doesn't have room to store

The solution to this problem is:

```
a) #include <ctype.h>
2  #include <stdbool.h>
3
4  ...
5
6  int read_line(char str[], int n)
7  {
8      int ch, i = 0;
9      bool non_space_char_exists = false;
10
11     while ((ch = getchar()) != '\n')
12         if (isspace(ch) && non_space_char_exists){
13             continue;
14         }
15
16         if (i < n)
17             str[i++] = ch;
18             non_space_char_exists = true;
19     str[i] = '\0';
20     return i;
21 }
```

```
b) #include <ctype.h>
2
3   ...
4
5   int read_line(char str[], int n)
6   {
7       int ch, i = 0;
8
9       while ((ch = getchar()) != '\n')
10          if (isspace(ch)){
11              break;
12          }
13
14          if (i < n)
15              str[i++] = ch;
16      str[i] = '\0';
17      return i;
18  }
```

```
c) #include <ctype.h>
2
3   ...
4
5   int read_line(char str[], int n)
6   {
7       int ch, i = 0;
8
9       while ((ch = getchar()) != '\n')
10          if (ch == '\n'){
11              break;
12          }
13
14          if (i < n)
15              str[i++] = ch;
16
17      str[i] = '\n';
18      str[i+1] = '\0';
19      return i;
20  }
```

```
d) #include <ctype.h>
2
3   ...
4
5   int read_line(char str[], int n)
6   {
7       int ch, i = 0;
8       int n = strlen(str) + 1;
9
10      do {
11          ch = getchar();
12
13          if (!ch) {
14              break;
15          }
16      }
```

```
15         }
16
17         str[i++] = ch;
18
19     } while (i < (n - 1));
20
21     str[i] = '\0';
22     return i;
23 }
```

Correct Solution

- c)

```
1  #include <ctype.h>
2
3  ...
4
5  int read_line(char str[], int n)
6  {
7      int ch, i = 0;
8
9      do {
10         ch = getchar()
11
12         if (ch == '\n'){
13             break;
14         }
15
16         if (i < n)
17             str[i++] = ch;
18
19     } while (ch != '\n');
20
21     str[i] = '\0';
22     return i;
23 }
```

- d)

```
1  #include <ctype.h>
2
3  ...
4
5  int read_line(char str[], int n)
6  {
7      int ch, i = 0;
8      int n = strlen(str) + 1;
9
10     do {
11         ch = getchar();
```

```
12
13         if (ch == '\n') {
14             break;
15         }
16
17         str[i++] = ch;
18
19     } while (i < (n - 1));
20
21     str[i] = '\0';
22     return i;
23 }
```

Notes

- Learned that `getchar()` always ends with `\n`

5. a) I need to write a function named `capitalize` that capitalizes all letters in its argument.

The requirement for this function is:

- Array subscripting must be used to access each character in string

The solution to this problem is:

```
1  #include <ctype.h> // toupper
2
3  void capitalize(char *s)
4  {
5
6      for (int i = 0; s[i] != '\0'; i++) {
7          s[i] = toupper(s[i]);
8      }
9  }
```

Notes

- **Accessing the Characters in a String**
 1. Using array subscripting

Example

```
int count_spaces(const char s[])
{
    int count = 0, i;

    for (i = 0; s[i] != '\0'; i++)
        if (s[i] == ' ')
            count++;
    return count;
}
```

2. Using pointer

Example

```
int count_spaces(const char *s)
{
    int count = 0;

    for (; *s != '\0'; s++)
        if (*s == ' ')
            count++;
    return count;
}
```

- b) I need to write a function named `capitalize` that capitalizes all letters in its argument.

The requirement for this function is:

- pointer must be used to access each character in string

The solution to this problem is:

```
1  #include <ctype.h> // toupper
2
3  void capitalize(char *s)
4  {
5      char *p = s;
6      while (*p != '\0') {
7          *p = toupper(*p);
8          p++;
9      }
10 }
```

- c) I need to write a function `sensor` that modifies a string by replacing every occurrence of `foo` with `***`.

The additional requirement of this function are:

- I need to make the function as short as possible without sacrificing clarity.

The solution to this problem is:

```
1  #include <string.h> \\ strlen
2
3  void sensor(char s[]) {
4      char *p;
5
6      if (strlen(s) < 3) {
7          return;
8      }
9
10     for (p = &s[2]; p < s + strlen(s); p++) {
11         if (tolower(*p) == 'o' &&
12             tolower(*(p-1)) == 'o' &&
13             tolower(*(p-2)) == 'f') {
14
15             *p = '*';
16             *(p-1) = '*';
17             *(p-2) = '*';
18         }
19     }
20 }
21
```