

Short Assignment – C basics

Question 1:

How many bytes do the following C types contain on your VM/machine:

`unsigned char`

`short`

`unsigned long long`

hint: we assume you will write code and run it on your VM. Note that the `sizeof(var)` compile-time function will tell you the size of a variable.

Question 2:

What is wrong with the following three C code fragments? Assume there may be other lines above and below the fragments, but the lines in #1 and #3 are adjacent.

```
/*1*/ struct abc *ptr;  
      printf("%d\n", ptr->field);
```

```
/*2*/ char *ptr = malloc(sizeof(ptr));
```

```
/*3*/ char *ptr = malloc(1000);  
      memset(&ptr, 0, 1000);
```

For each code fragment, explain in 1—2 sentences.

Question 3:

Below is a piece of C code. Read it and answer questions:

```
void change(char *source)
{
    source[0] = 'a';
    printf("%s\n", source);
}
```

Code snippet A:

```
char *a = "ABC";
change(a);
```

Code snippet B:

```
char b[] = "ABC";
change(b);
```

Code snippet C:

```
char *c = (char *) malloc(6);
strncpy(c, "ABC", 6);
change(c);
```

Questions:

3a) What are the outputs for code snippets A, B, and C, respectively?

[hints:

- these are valid C code. We encourage you to run them.
- you will need headers "string.h", "stdio.h", and "stdlib.h".]

Write down your results below.

3b) Do code A, B, and C produce the same outputs? If not, explain why they get different outputs.

3c) What lessons you learned from studying code A/B/C (all sending a "string" to the function)?

Write down what you learned in 1--2 sentences. (If you learned nothing, say "None".)

You may find the following C tutorials useful:

- <https://www.cprogramming.com/tutorial/c-tutorial.html> and especially <https://www.cprogramming.com/tutorial/c/lesson6.html>
- https://web.archive.org/web/20060909064119/http://einstein.drexel.edu/courses/Comp_Phys/General/C_basics/
- Some instructors have recommended Learn C The Hard Way (<https://learncodethehardway.org/c/>) although it's a whole mini-course with video lectures etc. and is probably more than most students need.

Submission instructions: Please submit your answer via Canvas, either in PDF format or via the text entry field.