hw2: C Programming 2 and Virtual Address Space

Due Feb 20 at 11:59pm **Points** 8 **Questions** 8
Available Feb 14 at 12am - Feb 21 at 11:59pm **Time Limit** 40 Minutes
Allowed Attempts 2

Instructions

You may use your notes, but not your friend's or other's help.

- Demonstrate understanding of the affect of modifying variables that have been declared as parameter, local, static local, or global variables.
- Trace code that uses arrays of structs, structs with array members, and arrays of pointers to structs with arrays
- Access elements in nested structs and arrays of structs.
- Identify the memory segments and the correct relative position within the VAS of a Linux IA-32 system.
- Replace CODE with expressions that produce the desired operation and outcome.
- Name the correct memory segment for all declared variables.

This quiz was locked Feb 21 at 11:59pm.

Attempt History

	Attempt	Time	Score
KEPT	Attempt 2	39 minutes	8 out of 8
LATEST	Attempt 2	39 minutes	8 out of 8
	Attempt 1	39 minutes	6 out of 8

Score for this attempt: **8** out of 8
Submitted Feb 20 at 11:39pm
This attempt took 39 minutes.

Question 1 — 1 / 1 pts

What is the output of the following program?

```
#include <stdio.h>

void func(void) {
    static int a = 10;
    a++;
    printf("%d ", a);
}

int main(void) {
    func();
    func();
    printf("\n");
    return 0;
}
```

- 11 11
- 10 12
- 10 11

Correct!

- 11 12
- 10 10

Question 2

1 / 1 pts

To avoid a limitation in Canvas, array code below has an extra space before the index.

```
typedef struct {
        char name[ 11];
        char *type;
        float weight;
} Pokemon;

int main(void) {
        Pokemon pokedex[ 7];
```

The description of `pokedex` is an array of Pokemon structures ?
The description of `pokedex[ 3]` is a Pokemon structure ?

Answer 1:

Correct!

an array of Pokemon structures

Answer 2:

Correct!

a Pokemon structure

Question 3

1 / 1 pts

```
typedef struct {
    char firstname[22];
    char lastname[22];
    char position[22];
} Teammate;

typedef struct {
    int      size;
    char     name[22];
    Teammate roster[33];
} Team;
```

Assume `team` has been initialized as follows:

```
Team team;
```

Which of the following code fragments will access the `lastname` data member of the teammate at index 0. Select all that are correct.

Correct!

- [x] `team.roster[0].lastname`
- [ ] `team->roster[0].lastname`
- [ ] `(*(*team).roster).lastname`

- [ ] `(*team->roster).lastname`

Correct!

- [x] `(*team.roster).lastname`

Question 4

1 / 1 pts

I'm the only memory segment that a process uses that is read only. Who could I be?

- [ ] Data Segment

Correct!

- [x] Code Segment
- [ ] Heap
- [ ] Kernel
- [ ] Stack

Question 5

1 / 1 pts

```
#include <stdlib.h>
#include <string.h>

typedef struct {
    char  title[55];
    char *author;
    int   pages;
} Book;

typedef struct {
    int   numBooks;
    Book *books[22];
} Shelf;

int main(void) {
    Shelf bookShelf[11];
    Book book;
    bookShelf[3].books[7] = NULL;
```

```
    //statement(s) added here
    strcpy(bookShelf[3].books[7]->author, "Seuss");
```

Which of the following statements are required to allocate heap memory so that the last statement will make "Seuss" the author of a book in the bookshelf? Select all that are required and don't worry about their order if more that one statement is selected.

Correct!

- [x] `bookShelf[3].books[7] = malloc(sizeof(Book));`
- [ ] `bookShelf = malloc(sizeof(Shelf) * 11);`
- [ ] `bookShelf[3] = malloc(sizeof(Shelf));`

Correct!

- [x] `bookShelf[3].books[7]->author = malloc(sizeof(char) * 50);`
- [ ] `bookShelf[3].books[7]->author = malloc(sizeof(char));`

Question 6

1 / 1 pts

Consider the following code:

```
#include  <stdio.h>
#include  <stdlib.h>

int a = 32;
int b;

int func(int arg) {
    static int tmp = 0;
    tmp++;
    return tmp;
}

int main(int argc, char *argv[]) {
    int *p = malloc(sizeof(int));
    *p = 43;
    char *str = "where am I?";
    printf("%s\n", str);
```

```
    return 0;
}
```

Where are `p` and `*p` stored in the program's virtual address space?

Correct!

- (●) Stack, Heap
- ( ) Stack, Stack
- ( ) Heap, Heap
- ( ) Heap, Stack
- ( ) Code, Heap

Question 7

1 / 1 pts

Below is a basic implementation of the Linux command "cat". This command is used to print the contents of a file on the console/terminal window.

```
#include <stdio.h>
#include <stdlib.h>

int main(int argc, char* argv[]) {

        FILE *fp;
        if(2 != argc) {
            printf("Usage: cat <filename>\n");
            exit(1);
        }
        if ((fp = fopen(argv[1], "r")) == NULL) {
            fprintf(stderr, "Can't open input file %s\n", argv[1]);
            exit(1);
        }
        char buffer[256];
        while (fgets(X, 256, fp) != NULL)
            fprintf(Y, "%s", buffer);
        fclose(Z);
        return 0;
}
```

Which one of the following replacements for **X**, **Y** and **Z** will result in correct execution?

Correct!

- (●) X = buffer, Y = stdout, Z = fp
- ( ) X = buffer, Y = fp, Z = stdout
- ( ) X = buffer, Y = stdin, Z = fp
- ( ) X = fp, Y = stdout, Z = buffer
- ( ) X = buffer, Y = fp, Z = fp

Question 8

1 / 1 pts

A process's memory segments in the virtual address space for a Linux based IA-32 system listed from high to low address are?

Correct!

- (●) Stack, Heap, Data, Code
- ( ) Stack, Data, Code, Heap
- ( ) Data, Stack, Heap, Code
- ( ) Heap, Stack, Code, Data
- ( ) Code, Data, Heap, Stack

Quiz Score: **8** out of 8