

CS 210 - Introduction to Computer Science
Fall 2016 - Exam 3 Review 2

Exam 3 will be on Thursday, November 17. The exam is open book and open notes.

The exam will consist of questions on the material in Chapter 7, 8, 10, 12, & 13. The format of the exam will be similar to that of in-class exercises, homework questions, lab questions, and programming assignments. That is, you will be asked to write implementations for programs and functions to solve particular problems, and you will be asked to read and write C code examples.

The following is a list of topics that will be emphasized.

1. Use of arrays as parameters.
2. Multi-dimensional arrays
3. Strings and string operators.
4. Personal libraries and header files.
5. Pointers.
6. Dynamic memory allocation.
7. Structs
8. Short answer on linked lists, stacks, and queues

When you are asked to write code, you will not need to write comments, function prototypes, include directives, or output formatting beyond producing new lines in appropriate places.

1. Write a definition for a struct called `myType_t` which has two doubles, `x`, and `y`, along with a string `s`. Show how to define a variable of type `myType_t` and initialize its variables to `x = 4.2`, `y = 9.7`, and `s = "Hello Mom!"`.

2. A struct defined below has a 2D array. Write a sequence to fill the array with random ints that range from $5 \leq x \leq 22$.

```
#include<stdio.h>
#include<string.h>
#include<stdlib.h>
typedef struct
{
    int a[5][9];
}ds_t;
```

3. Show what is printed by the following sequence:

```
char s1[] = "bananas";
char s2[80] = "hello ";
char s3[80] = "abc";
strcat(s2, s1);
strcpy(s3, s1);
printf("%s\n", s2);
printf("%s\n", s1);
printf("%s\n", s3);
printf("%d\n", strlen(s1));
strncpy(s1, s2, 3);
printf("%s\n", s1);
```

4. Write a function which receives a string argument and returns the number of period characters in the string.

5. Write a function which receives a string argument and returns the number of digits in the string.

6. Write a function which receives a string argument and returns the *index* of the *letter* which is first alphabetically.

7. The main program below creates a 2D array of ints and fills it with random numbers in the range 0 to 100.

A) Write the code necessary to find and print the average of the rows of the array.

B) Write the code necessary to find and print the average of the columns of the array.

```
#include<stdio.h>
#include<stdlib.h>
int main()
{int d[8][6];
  int r, c;
  for(r=0;r<8;r++)
    {for(c=0;c<6;c++)
      d[r][c] = rand() % 101;
    }
}
```

8. A function has the prototype given by:

```
int FindCol(int d[][200], int row, int cSize);
```

where r is a row number and $cSize$ is the number of columns.

Write the function such that it will look at row row and return the index of the first entry it finds which has a value of zero. If there are no zeros in row r return -1.

9. Suppose we define a struct as follows:

```
deftype struct
{int i;
 double x;
 char c;
}myType_t
```

I can create two variable of type struct like this:

```
myType_t a, b;
```

I want to write a function, MyFun, which returns a void and accepts a by value and b by reference.

A) Write the prototype for the function.

B) Write the code necessary to call the function from the main program.

10. Show what is printed by each of the following:

```
char s1[] = "abc";
char s2[] = "bcd";
char s3[] = "abcd";
char s4[] = "ABC";
char s5[] = "123";
```

A) `printf("%s to %s = %d\n", s1, s2, strcmp(s1, s2));` _____

B) `printf("%s to %s = %d\n", s1, s3, strcmp(s1, s3));` _____

C) `printf("%s to %s = %d\n", s1, s4, strcmp(s1, s4));` _____

D) `printf("%s to %s = %d\n", s1, s1, strcmp(s1, s1));` _____

E) `printf("%s to %s = %d\n", s1, s5, strcmp(s1, s5));` _____