

Exam is closed-book, closed-friends and closed-internet. All code has to be developed from scratch, no copy and paste. You may use your own memory-sheet (one sheet, front and back).

Material covered: Lessons 6 (second part), 7, 8, 9, 10

Lesson 6

1] Write a program to print all the multiples of 7 between 1 and 100 in reverse order, using a **for** loop, a **while** loop, and then a **do...while** loop.

Lesson 7

2] Spot the mistake:

```
int a[50], i;

for(i=0; i<50; i++)
    a[i] = 3*i+1;
for(i=0; i<50; i++)
    printf("%5.2f", a[i]);
printf("\n\n");
```

3] Write a program with **printf()** statements using 3 different format specifiers for floating point numbers. (Many solutions are possible!)

4] Any program that uses the function **scanf()** should also include _____.

Lesson 8 - Arrays

5] What happens if we assign a value to an array element whose subscript exceeds the size of the array?

- A. The element will be set to 0.
- B. The compiler would report an error.
- C. The program may crash if some important data gets overwritten.
- D. The array size would appropriately grow.

6] In C, what actually gets passed if we pass an array as an argument to a function?

- A. Value of elements in the array
- B. First element of the array
- C. Base address of the array
- D. Address of the last element of the array

7] What does this program print?

```
int arr[5] = {2, 6, 5, 7, 9};
int s = 0, c;
for (c = 0; c < 5; c = c + 1){
    if (arr[c] < 6){
        s = s + arr[c];
    }
}
printf("%d\n", s);
```

8] What does this program print?

```
#include <stdio.h>
int main() {
    double a[3] = { 1.5, 2, 4 };
    printf( "a[1] = %f\n", a[1] );
    return 0;
}
```

9] Write a C function that computes the maximum of a 2D array of size 4 by 5.

10] Write a C function that computes the total sum of a 2D array of size 4 by 5.

11] Write C statements to do the following:

- Declare an array alpha of 17 components of type int.
- Output the value of the 12th component of the alpha array.
- Set the value of the 5th component of the alpha array to 35.
- Set the value of the 9th component of the alpha array to the sum of the 6th and 13th components of the alpha array.
- Set the value of the 4th component of the alpha array to three times the value of the 8th component minus 57.
- Output alpha so that five components appear on each line:

12] What is stored in the **list** array after the following code executes?

```
int list[6];
int j;
for (j = 0; j < 6; j++) {
    list[j] = 3 * j + 4;
    if (j % 3 == 0) {
        list[j] = list[j] - 2;
    }
}
```

13] Write a complete C program to declare and initialize a 10x10 matrix with this pattern of elements. Remember to keep inside the limits of the rows and columns.

0	2	4	6
1	3	5	7
2	4	6	8
3	5	7	9

1	2	0	0
0	2	3	0
0	0	3	4
0	0	0	4

42	41	40	39
38	37	36	35
34	33	32	31
30	29	28	27

14] Exercise 9 (p.211):

9. Write a function named `addarrays()` that accepts two arrays that are the same size. The function should add each element in the arrays together and place the values in a third array.

15] TRUE FALSE (circle one): Only simple (scalar) variables can be passed as function arguments, arrays cannot be.

16] How many bytes of memory are reserved for the variable **s** as result of this line?

```
unsigned int s[] = {-100, 42, 43, 0, 1};
```

Show the work: _____

Final answer: _____ bytes.

17] Assume that the arrays **a** and **b** have already declared and initialized with 10 integers each. Will the following expression be accepted by the C compiler?

a[b[5]] = 42; Answer: YES NO

Lesson 9 - Pointers

18] What is the output of this program? (explain in your own words when the actual values are not known)

```
#include <stdio.h>
int *ptr, x;
int a[5]={100,200,300,400,500};
int *ptr2;
void main() {
    ptr=NULL;
    x=500;
    ptr=&x;
    printf("%d %p %p %p\n", x, ptr, &x, &ptr);
    ptr2=a;
    *(ptr2+1)=*ptr;
    *ptr= *ptr2 + *(ptr2+2);
    printf("%d %p %d\n", x, *ptr, *ptr2);
}
```

19] Identify the errors in the following fragment of code:

```
double b[100];
int j;

b[98]      = 42;
*(b+99)    = 43;
*(b+100)   = 44;
*b + 101   = 45;
b--;
```

20] When we _____ a pointer, we gain access to the data it is pointing to.

Lesson 10 – Characters and strings

21] Write a function that takes a string as only argument and prints the ASCII codes of each character. The function returns void.

22] Write a program that prompts the user repeatedly to enter a string, and displays the length of each string entered. The program exits when the user enters an empty string.

23] For each program below, decide if the program is correct; if not, explain why, if yes, figure out what is printed:

- (b)

```
#include <stdio.h>
void main() {
    double d=10, *p;
    printf("d = %f\n", d);
    p = &d;
    scanf("%f", p);
    printf("d = %f\n", d);
}
```
- (c)

```
#include <stdio.h>
void main() {
    char s1[] = "COSC 1310";
    char s2[10];
    s2 = s1;
    printf("s2 = %s\n", s2);
}
```

Review all in-class quizzes from chs. 6 (second part), 7, 8, 9, 10!!