C: arrays; strings; input; struct

COSC 208, Introduction to Computer Systems, 2022-02-01

Warm-up: Arrays

Q1: *What is the output of this program?*

```c
int main() {
    int sum = 0;
    int nums[] = { 1, 3, 5, 7 };
    for (int i = 0; i < 3; i++) {
        nums[i+1] -= 1;
        sum += nums[i];
    }
    printf("%d\n", sum);
}
```

Q2: *What is the output of this program?*

```c
int main() {
    int sum = 0;
    int zeros[10];
    for (int i = 0; i < 10; i++) {
        sum += zeros[i];
    }
    printf("%d\n", sum);
}
```

Q3: *What is the output of this program?*

```c
int main() {
    int sum = 0;
    int nums[] = { 1, 2, 3 };
    for (int i = 0; i <= 3; i++) {
        sum += nums[i];
    }
    printf("%d\n", sum);
}
```

🛑 Stop here after completing the warm-up; if you have extra time please **skip ahead** to the extra practice.

Strings

Q4: *What is the output of this program?*

```
#include <stdio.h>
#include <string.h>
int main() {
    char first[] = "Colgate";
    char second[10] = "Univ";
    printf("%lu\n", strlen(first)); printf("%lu\n", strlen(second));
    first[strlen(first)] = '-';     second[strlen(second)-1] = '.';
    printf("%s%s\n", first, second);
    first[3] = '.';                 first[4] = '\0';
    printf("%s %s\n", first, second);
}
```

Q5: *What is the output of this program?*

```
int main() {
    char first[] = "Systems is fun!";
    char second[] = "Systems is fun!";
    if (first == second)
        printf("1st == 2nd\n");
    if (strcmp(first, second) == 0)
        printf("1st cmp 2nd\n");
    if (first == first) {
        printf("1st == 1st\n");
    if (strcmp(first, first) == 0)
        printf("1st cmp 1st\n");
}
```

Q6: *Write a program that asks the user for a string and prints the string backwards.*

```

```

Array & string: extra practice

QA: *Write a function called `avg` that takes an array of integers and the length of the array and returns the average of those integers.*

QB: *Write a function called `count` that takes an array of integers, the length of the array, and an integer to search for and returns the number of times the specified integer appears in the array.*

QC: *Write a program that asks the user for a string and converts all lowercase letters to uppercase and all uppercase letters to lowercase; numbers and punctuation should be left unchanged.*

QD: *Write a program that asks the user for a string and checks if the string is a palindrome (i.e., reads the same forwards and backwards).*

structs

Q7: *What is the output of this program?*

```
struct one {
    char x;
    char y;
    short z;
};
struct two {
    int m;
    int n[10];
};
int main() {
    struct one a;
    struct two b;
    printf("%d %d\n", sizeof(struct one), sizeof(a.z));
    printf("%d %d\n", sizeof(b), sizeof(b.n));
}
```

Q8: *What is the output of this program?*

```
struct alpha {
    char x[10];
    int y;
};
struct beta {
    int b;
    int c;
};
int main() {
    struct alpha a = { "Colgate", 13 };
    struct beta b = { 1, 2 };
    struct beta c = { 3, 4 };
    a.y += -13;
    b.b = 5;
    c = b;
    b.c = 6;
    printf("a %s %d\n", a.x, a.y);
    printf("b %d %d\n", b.b, b.c);
    printf("c %d %d\n", c.b, c.c);
}
```

`struct`s: extra practice

QE: *Write a `struct` definition to represent a date (year, month number, and day).*

QF: *Write a function called `compare` that takes two date `struct`s and returns -1 if the first date occurs before the second, 0 if the dates are equal, and 1 if the first date occurs after the second.*

Worksheet created by Professor Aaron Gember-Jacobson