LAB 5 - Pointers and Structs

1. What is the difference between the following two declarations 2 pts

```
int *p[10];   // An array of 10 integer pointers.
int(*p)[10];  // A pointer to the entire array.
```

2. Please explain the following two declarations. 3 pts

```
// A function pointer that takes a char array pointer and returns an integer.
int (*p)(char(*a)[]);
// A function that takes a char array pointer and returns an integer pointer.
int *p(char(*a)[]);
```

3. Take a look at the following code snippet. Here **pFcn** is a pointer to a function that takes two integer arguments and returns an integer. To make the different cases in switch statement work, write a few functions such as 'Add' , 'Subtract', 'Multiply', 'Divide' that take two integers as arguments and return an integer. Print the value of **pFcn(X,Y)** for all these cases. 4 pts

   Submit as a complete working code named as **FunctionPointer.c.**

```
#include <stdio.h>
int (*pFcn)(int, int);
int main() {
  int X, Y, operation;
  printf("Enter a number: ");
  scanf(" %d", &X);
  printf("Enter another number: ");
  scanf(" %d", &Y);
  printf("Enter an operation (0=add, 1=subtract, 2=multiply, 3= Divide ): ");
  scanf(" %d", &operation);
  switch (operation) {
    // case 0: pFcn = Add; break;
    // case 1: pFcn = Subtract; break;
    // case 2: pFcn = Multiply; break;
    // case 3: pFcn = Divide; break;
  }
  // printf("The answer is : %d\n", pFcn(X,Y));
  return 0;
}
```

4. Take a look at the following code snippet 2 pts

```
struct Person {
  char  name[BUFSIZ];
  char  ssn[BUFSIZ];
  int   age;
  float height;
  float weight;
};

struct Person p1;
strcpy(p1.name, "Alfred Morino");
strcpy(p1.ssn, "496-50-2260");
p1.age    = 50;
p1.height = 170.5;
p1.weight = 70.5;
struct Person *ptr = &p1;
```

What will be printed by the following expressions? Provide the screenshot.

```
printf("Name = %s\nSSN = %s\nAge = %d\nHeight(cm) = %g\nWeight(kg) = %g\n",
       p1.name, p1.ssn, p1.age, p1.height, p1.weight);
printf("Name = %s\nSSN = %s\nAge = %d\nHeight(cm) = %g\nWeight(kg) = %g\n",
       ptr->name, ptr->ssn, ptr->age, ptr->height, ptr->weight);
printf("Name = %s\nSSN = %s\nAge = %d\nHeight(cm) = %g\nWeight(kg) = %g\n",
       (*ptr).name, (*ptr).ssn, (*ptr).age, (*ptr).height, (*ptr).weight);
printf("Name = %s\nSSN = %s\nAge = %d\nHeight(cm) = %g\nWeight(kg) = %g\n",
       (&p1)->name, (&p1)->ssn, (&p1)->age, (&p1)->height, (&p1)->weight);
```

```
Name = Alfred Morino
SSN = 496-50-2260
Age = 50
Height(cm) = 170.5
Weight(kg) = 70.5
Name = Alfred Morino
SSN = 496-50-2260
Age = 50
Height(cm) = 170.5
Weight(kg) = 70.5
Name = Alfred Morino
SSN = 496-50-2260
Age = 50
Height(cm) = 170.5
Weight(kg) = 70.5
Name = Alfred Morino
SSN = 496-50-2260
Age = 50
Height(cm) = 170.5
Weight(kg) = 70.5
```

5. Take a look at the attached file "**structConversion.c**". Use the following struct template named "**Person**" in the program. Modify existing **printData** and **readData** functions as follows. 9 pts (total)

```
void          printData(struct Person x);  // 3 pts
struct Person readData();                  // 3 pts
// Replace gets with fgets.                // 3 pts
```

You can use any additional helper functions. Submit the complete file as "**structConversionLab5.c**" file.

Submission:

A zip file containing:
• Your Complete C code named **FunctionPointer.c, structConversionLab5.c** and a pdf file named

PointersAndStructLab5.pdf containing the answers to questions 1, 2 with output capture for C code for question 4.

Name your zip file with your last name first letter of your first name Lab5.zip (ex: **yasminsLab5.zip**)
Submission deadline is: 11:59 pm, Tuesday, November 23. No late submissions will be considered.