

SENECA COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SCHOOL OF SOFTWARE DESIGN & DATA SCIENCE

MIDTERM TEST

<u>SEMESTER</u>	<u>SUBJECT NAME</u>	<u>SUBJECT CODE</u>
<u>Fall 2022</u>	<u>Introduction to Programming Using C</u>	<u>IPC144</u>

NAME: _____

STUDENT NUMBER: _____

SECTION: _____

TIME ALLOWED: 1.0 Hour (60 min.)

QUESTIONS:

Part A	Explain Concepts	8	Marks
Part B	Walkthrough	12	Marks
Part C	Code Writing	20	Marks
	TOTAL MARKS	40	

PROFESSOR: _____

SPECIAL INSTRUCTIONS:

1. Write your answers in the spaces provided
2. You can have a non-scientific calculator, you are not permitted to use your cell phone

This test includes a *cover page*, plus 6 pages of *questions*.

SENECA'S ACADEMIC INTEGRITY POLICY

As a Seneca student, you must conduct yourself in an honest and trustworthy manner in all aspects of your academic career. A dishonest attempt to obtain an academic advantage is considered an offense, and will not be tolerated by the College.

Section A (Concepts)

1. (2 marks) Explain why it is better to work with currency as integers rather than floating point.

2. (2 marks) In one or two sentences explain how a flag variable can be used to enforce the single entry/exit principle for a loop.

3. (2 marks) Many organizations ask their programmers to follow style guidelines. Give at least two reasons why this is a good idea. What might happen if they did not have guidelines?

4. (2 marks) Programmers are often told that they should initialize all of their variables at the start of their programs. Explain in two or three sentences why this is a good idea and what can happen if variables are not initialized.

Section B (Code Walkthroughs)

The program below performs some computations and prints some output. You are to trace the execution of the program by writing the line number, a short description of what is happening on that line, and if there are variables in the line of code, their respective value(s). Output statements should be described by stating exactly what should be displayed on the screen enclosed in double quotes. Use the space provided below the source code to record your answer. (12 marks)

```
01 | #include <stdio.h>
02 | int main(void) {
03 |     int monthDays[] = { 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 };
04 |     char monthNames[] = { 'J', 'F', 'M', 'A', 'M', 'J', 'J', 'U', 'A', 'S',
05 |         'O', 'N', 'D' };
06 |     int days, j, weeks, month, tmp;
07 |
08 |     for (days = 0; days < 141; days+=70) {
09 |         weeks = days / 7;
10 |         tmp = monthDays[0];
11 |         for (j = 0; tmp < days; j++) {
12 |             tmp += monthDays[j + 1];
13 |         }
14 |         month = j;
15 |
16 |         printf("%d %d %c\n", days, weeks, monthNames[month]);
17 |     }
18 |     return 0;
19 | }
```

Explain each line in the space provided below:

SAW

Section C (Programming Problems)

(20 marks)

You are running a swim meet that will select those who swim faster than the average speed and these swimmers will be sent on to compete at the provincial level. Each swimmer is given a number, which they will pin to their swimsuit, and will identify them throughout the competition. We are not sure exactly how many people will participate, so we plan for a maximum of 20 and have the program count the exact number whose data is entered. The program will ask for the id and time for each swimmer, store the information, calculate the average and then print out the swimmers and their times if they swam less than the average time. Fill in the blanks in the code below to make a working program from the skeleton code you are given.

```
#include <stdio.h>
#define MAX_SWIMMERS 20

void main(void)
{
    // declare storage for information on each swimmer

    _____ Swimmer    // 1 mark
    {
        _____; // swimmer id(whole number)[1 mark]
        _____; // time to complete course in
                    // fractional minutes[1 mark]
    };

    // declare an ARRAY of type Swimmer for maximum number of swimmers
    _____ ; // array of swimmer [4 marks]

    int i, swimmerID;
    int numSwimmers = 0; // number of swimmers who actually participate
    double swimTime;
    double avgTime; // average swim time
    double totalTime = 0.0; // total time for all swimmers

    printf("Enter the swimmer number(0 to exit) and swim time: ");
    scanf("%d%lf", &swimmerID, &swimTime);

    // read data while we have a valid swimmer ID

    while(_____) // 2 marks
    {
        // store the swimmerID and swimTime into the array
        _____ ; // 2 marks
    }
}
```

```
_____ ; // 2 marks

// increment the number of swimmers
numSwimmers++;
// accumulate the totalTime for all swimmers

_____ ; // 1 mark

printf("Enter the swimmer number(0 to exit) and swim time: ");
scanf("%d%lf", &swimmerID, &swimTime);
}
// calculate the average swim time

avgTime = _____ ; // 1 mark

printf("Swimmers faster than average are: \n");

for (i = 0; i < _____; i++) // 1 mark
{
    // select and print swimmers whose time is less than the average

    if ( _____ ) // 2 marks
    {
        printf("%d %.2lf\n", _____,
            _____ ); // 2 marks
    }
}

return 0;
}
```