

---

SAMPLE EXAM PAPER

FEEG6002 Advanced Computational Methods 1

DURATION 120 MINS

---

**Answer All Questions.**

**This is a Computer-Based Exam.**

**Please note that the sample exam paper contains only five questions. The real examination paper contains more than five questions, with a time limit of 120 minutes.**

1.
  - a). What is a pointer in the C programming language?
  - b). What is the purpose of the "&" operator as a prefix to a variable name?
  - c). Would the address of a given variable in a compiled C program be the same each time that program is invoked?. Explain your answer.

**Answer this question using the notepad editor to open the file q1.txt. You must save the file upon completion.**

2. Find the error in each of the following and explain how the error can be corrected.

- a). The following statement should print the character 'c'.

```
printf( "%s\n", 'c' );
```

- b). The following statement should print 9.375%.

```
printf( "%.3f%", 9.375);
```

- c).

```
printf("A string in quotes");
```

- d).

```
printf( %d%d, 12, 20);
```

- e).

```
printf ("%c", "x");
```

**Answer this question using the notepad editor to open the file q2.txt. You must save the file upon completion.**

3. Open and extend the program q3.c to find the largest of three integers. You should write a function, 'find\_greatest', that accepts three integers of type 'int' and returns the greatest of those as an integer of the same type. You are encouraged to use the template and main() function provided to check your work.

```
#include <stdio.h>

int main(void){
int a,b,c;
a=10;
b=8;
c=2;
printf("The largest of %d, %d and %d is: %d\n", a,
b, c, find_greatest(a, b, c));
return 0;
}
```

**Answer this question using the Quincy editor to open and extend the file q3.c. You must save the file upon completion.**

4. Open and extend the program q4.c by adding a function, 'standard\_deviation', which should accept four parameters of type double and return their population standard deviation as a number of type double. The population standard deviation of 'N' numbers may be expressed as follows:

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (X_i - \mu)^2} \text{ with mean value, } \mu = \frac{1}{N} \sum_{i=1}^N X_i$$

**TURN OVER**

```
#include <stdio.h>
#include <math.h>

int main(void) {
double a, b, c, d, stddev;
a = 16.3;
b = 24.2;
c = 733;
d = 12.27;

stddev = standard_deviation(a, b, c, d);

printf("Standard deviation of %f, %f, %f, %f
is %f\n", a, b, c, d, stddev);

    return 0;
}
```

**Answer this question using the Quincy editor to open and extend the file `q4.c`. You must save the file upon completion.**

5. Open and extend the program q5.c by adding a function 'populate\_array' which accepts a pointer to an array of type long, and the number of elements of that array as type long. Your function should assign even integer values to the elements of that array such that those values are given by doubling the index of the element and adding two, i.e. element 0 will hold 2, element 1 will hold 4, etc.

```
#include <stdio.h>
#include <stdlib.h>

int main(void) {
    long size = 10;
    long i;

    long *array = malloc(sizeof(long) * size);

    populate_array(array, size);

    for(i=0; i < size; i++) {
        printf("array[%04ld] = %ld\n", i, array[i]);
    }

    free(array);
    return 0;
}
```

**Answer this question using the Quincy editor to open and extend the file q5.c. You must save the file upon completion.**

**END OF PAPER**