

UNIVERSITY OF PORTSMOUTH

FACULTY OF TECHNOLOGY

Department of Electronic and Computer Engineering

B142L – Introduction to Computing

U13746

Date: May 2010

Time: 90 minutes

INSTRUCTIONS

Write your student ID number clearly on page 2.

Write your answers to all 10 questions within the spaces provided in this examination paper.

Handwritten notes are permitted with this examination.

Calculators permitted are:

Casio FX 85WA

Casio FX 83WA

Casio FX 85MS

Examiner:

Professor Ron Pethig, Chi Nguyen

Student ID Number

SOLUTIONS

QUESTION 1

- a) Place an "X" in the box next to **3 terms** that are most directly related to the use of **arrays** in a C program. [3 Marks]

	first
1	length
1	element
	default
	head

	main
	range
1	index
	shift
	tail

- b) Write a C program to collect the ticket prices at 50 movie theatres, store them in an array and display the average ticket price. Show or use all the terms selected in part (a). [7 Marks]

Similar to:

```
#define LENGTH 50 [1]

int main( void )
{
    double prices[ LENGTH ]; [1]
    double total = 0;
    int index;

    for ( index = 0; index < LENGTH; index++ ) [2]
    {
        scanf( "%lf", &prices[ index ] ); [1]
        /* each price is stored as an array element */
        total += prices[ index ]; [1]
    }

    printf( "Average ticket price is %0.2lf", total / LENGTH ); [1]
}
```

QUESTION 2

Modify the following source code to correct all errors. Line numbers have been provided for reference. Indicate specific line numbers in your answers when necessary. [10 Marks]

```
01: #define COORDINATES = 10
02:
03: int main( void )
04: {
05:     int x = 10;
06:     int y = 0;
07:
08:     printf( "The following are %s coordinates on the line, y = 4x + 5",
09:            COORDINATES );
10:
11:     do
12:     {
13:         printf( "\n x = d, y = d", x, (4x ) + 5 );
14:         x = y;
15:     } while( x < COORDINATES )
16: }
```

```
#define COORDINATES 10 [1]

int main( void )
{
    int x = 0; [2]
    int y = 0;

    printf( "The following are %d coordinates on the line, y = 4x + 5", [2]
           COORDINATES );

    do
    {
        printf( "\n x = %d, y = %d", x, (4 * x ) + 5 ); [2]
        x++; [2]
    } while( x < COORDINATES ); [1]
}
```

QUESTION 3

Consider the following source code. Line numbers have been provided for reference. Indicate specific line numbers in your answers when necessary.

```
01: #include <string.h>
02:
03: int count_letters_z( char* );
04:
05: int main( void )
06: {
07:     char input[ 64 ] = { '\0' };
08:
09:     scanf( "%s", input );
10: }
```

- a) Modify the source code to **define the count_letters_z() function which returns the number of 'z' characters found in the input word**. For example, the function would return a value of 1 for the input string "zero". **[8 Marks]**

Add after line 10:

```
int count_letters_z( char *word ) [2]
{
    int quantity = 0;
    int index;

    for ( index = 0; index < strlen( word ); index++ ) [2]
        if ( word[ index ] == 'z' ) [2]
            quantity++; [1]

    return quantity; [1]
}
```

- b) Modify the source code to **use the count_letters_z() and display the return value to output**. **[2 Marks]**

Add between lines 9 and 10:

```
printf( "Found %d instances of z", count_letters_z( input ) ); [2]
```

QUESTION 4

a) Place an "X" in the box next to **3 terms** that are most directly related to **selection and decisions** in the C language. [3 Marks]

	local
1	else
	loop
1	if
1	or

	sprintf
	return
	stdout
	stderr
	stdin

b) Write a C program to **ask for an input number until the input matches one of the secret numbers. Display a message to inform the user when the input does not match. The secret numbers are 45 and 47.** Show or use all the terms selected in part (a). [7 Marks]

Similar to:

```
int main( void )
{
    int guess;

    while ( 1 ) [1]
    {
        scanf( "%d", &guess ); [1]
        if ( ( guess == 45 ) || ( guess == 47 ) ) /* or logic */ [2]
            break; [1]
        else [1]
            printf( "Try again\n" ); [1]
    }
}
```

QUESTION 5

Consider the following source code. Line numbers have been provided for reference. Indicate specific line numbers in your answers when necessary.

```
01: #include <string.h>
02:
03: int main( void )
04: {
05:     char input[ 25 ] = { '\0' };
06:     int counter = 0;
07:
08:     scanf( "%s", input );
09:
10:     do
11:     {
12:         if ( input[ counter ] == 's' )
13:             break;
14:
15:         printf( "%s\n", input );
16:
17:         counter = counter + 6 / 2;
18:     } while ( counter < strlen( input ) );
19: }
```

a) List the program output when the **input value is the string "course"**. [3 Marks]

```
course
course [3]
```

b) Describe input values that would produce **longest output display**. [7 Marks]

```
String containing 22, 23 or 24 characters [5]
none of which is an 's' character. [2]
```

QUESTION 6

Consider the following source code. Line numbers have been provided for reference. Indicate specific line numbers in your answers when necessary.

```
01: int main( void )
02: {
03:     int total_cookies = 40;
04:     int order_quantity;
05: }
```

- a) Modify the source code to **accept the order quantity as an input value and display the total cost of the order when the price is £0.15 per cookie.** [4 Marks]

Add between lines 4 and 5:

```
double order_value = 0.0; [1]

scanf( "%d", &order_quantity ); [1]

order_value = order_quantity * 0.15; [1]
printf( "Total order value is £%0.2lf", order_value ); [1]
```

- b) Modify the source code to **display an error message when the order quantity is less than 1 or more than the total available cookies.** [6 Marks]

Add between lines 4 and 5:

```
double order_value = 0.0;

scanf( "%d", &order_quantity );

if ( ( order_quantity < 1 ) || ( order_quantity > total_cookies ) ) [4]
{
    printf( "Error with the order quantity." ); [1]
}
else [1]
{
    order_value = order_quantity * 0.15;
    printf( "Total order value is £%0.2lf", order_value );
}
```

QUESTION 7

a) Place an "X" in the box next to **3 terms** that are most directly related to the use of **iterative loops** in a C program. [3 Marks]

1	initialization		format
	assignment		input
	declaration		void
	selection	1	body
	global	1	for

b) Write a C program to **display all integer numbers between 55 and 500** (inclusive) **which are divisible by 4**. Show or use all the terms selected in part (a). [7 Marks]

```
Similar to:

int main( void )
{
    int index;

    /* initialization sets the value of index to 55 */
    for ( index = 55; index <= 500; index++ )           [4]
    {
        /* The following 2 lines are the body of the loop */
        if ( ( index % 4 ) == 0 )                       [2]
            printf( "%d\n", index );                   [1]
    }
}
```

QUESTION 8

Modify the following source code to correct all errors. The program is intended to **continue asking for an input string until the input string is at least 4 characters in length and the first letter is upper case**. Line numbers have been provided for reference. Indicate specific line numbers in your answers when necessary. [10 Marks]

```
01: #define <string.h>
02: #define <ctype.h>
03:
04: int main( void )
05: {
06:     string word[ 64 ] = { '\0' };
07:     int finish = 64;
08:
09:     do
10:     {
11:         scanf( "%lf", word );
12:
13:         if ( strlen( word ) >= 64 )
14:         {
15:             if ( isupper( word[ 0 ] ) )
16:                 finish = 1;
17:         }
18:     } while ( ! finish )
19: }
```

```
#include <string.h> [1]
#include <ctype.h> [1]

int main( void )
{
    char word[ 64 ] = { '\0' }; [2]
    int finish = 0; [2]

    do
    {
        scanf( "%s", word ); [1]

        if ( strlen( word ) >= 4 ) [2]
        {
            if ( isupper( word[ 0 ] ) )
                finish = 1;
        }
    } while ( ! finish ); [1]
}
```

QUESTION 9

Write a C program that **uses an array to store 15 numbers provided below**. The program **must continue asking for an input number until the guess matches one of the numbers stored in the array**. [10 Marks]

3, 5, 6, 8, 11, 12, 16, 17, 18, 23, 24, 29, 30, 31, 37

Similar to:

```
int main( void )
{
    int numbers[] = { 3, 5, 6, 8, 11, 12, 16, 17, 18, 23, 24, 29, 30, 31, 37 };    [2]
    int finish = 0;                                                                [1]
    int guess, index;

    do
    {
        scanf( "%d", &guess );                                                    [1]

        for ( index = 0; index < 15; index++ )                                    [2]
            if ( numbers[ index ] == guess )                                     [2]
                finish = 1;
    } while ( ! finish );                                                         [2]
}
```

QUESTION 10

a) Place an "X" in the box next to **3 terms** that are **basic data types** in the C language.

[3 Marks]

<input type="checkbox"/>	variable
1	integer
<input type="checkbox"/>	string
<input type="checkbox"/>	array
<input type="checkbox"/>	real

<input type="checkbox"/>	imaginary
1	character
<input type="checkbox"/>	complex
1	double
<input type="checkbox"/>	static

b) Write a C program to **calculate and display the average price of the mobile phones provided below**. Show or use all the terms selected in part (a).

[7 Marks]

Nokia 5800	£64.99
Sony Ericsson C510	£89.99
Samsung Jet	£124.95
Nokia N97	£199.99

Similar to:

```
int main( void )
{
    double average_price = ( 64.99 + 89.99 + 124.95 + 199.99 ) / 4.0;           [3]
    int phones = 4;                                                            [1]
    char message[] = "The average price of %d phones is %0.2lf";              [2]

    printf( message, phones, average_price );                                  [1]
}
```