Family Name:..... **Other Names:**.....

Student ID:..... **Signature**.....

NWEN 241: Test 2

2021, November 3 ** WITH SOLUTIONS **

Instructions

- Time allowed: **30 minutes**
- Attempt **all** the questions. There are 50 marks in total.
- Write your answers in this exam paper and hand in all sheets.
- If you think some question is unclear, ask for clarification.
- You may use dictionaries.
- You may write notes and working on this paper, but make sure your answers are clear.

Hint: There might be more than one correct answer for each multiple choice question

Question 1. A location in memory. **[2 marks]**

- ☐ is reserved whenever a variable is declared. ☑
- ☐ is reserved when a variable is used in a program.
- ☐ can hold several different values at the same time.
- ☐ cannot be reused once it is assigned a value.

Question 2. Consider the following C code snippet: **[2 marks]**

```
struct computer
{
    char manufacturer[10];
    double price;
    int speed;
};
```

The correct statement to assign a value of $800 to the data member price in the structure pc1 is

- ☐ struct price = 800;
- ☐ struct computer.price = 800;
- ☐ struct pc1− >rice = 800;
- ☐ pc1.price = 800; ☑
- ☐ pc1− >price = 800;

Question 3. What is the output of the following code snippet? **[5 marks]**

```
struct hurricane
{
    char name[10];
    int year, category;
};
int main(void)
{
    struct hurricane h1 = {"Audrey", 1957, 4};
    struct hurricane h2 = {"Frederic", 1979, 3};

    printf("%s \n%s \n", h2.name, h1.name);
    printf("Category %d hurricane: %s \n", h1.category, h1.name);
}
```

Frederic
Audrey
Category 4 hurricane: Audrey

Question 4. Assume that an array g is defined with the following statement: **[4 marks]**

```
int g[ ] = {2,4,5,8,10,32,78};
int *ptr1 = &g[0];
int *ptr2 = &g[3];
```

What is the value of each of the following expressions?

*g	2
*(ptr1+1)	4
*(g+5)	32
*(ptr2+2)	32

Question 5. Write a function that receives a pointer to a character string and a character. The function should return the number of times that the character occurred in the string. Assume that the function has the following prototype statement: **[8 marks]**

```
int charcnt(char *ptr,char c);
```

```
int charcnt(char *ptr,char c)
{

        int n;
        for(n=0; *ptr!='\0'; ptr++)
        {
            if(*ptr == c){n++;}
        }
        return n;









}
```

Question 6. Consider the following C code snippet: **[4 marks]**

```
char *carr = (char *) malloc(5 * sizeof(char));
for(int i=0; i<5; i++)
    carr[i] = 'a'+i;
char *darr = (char *) realloc(carr, 15*sizeof(char));
```

Assume that both malloc() and realloc() were successful.

(a) **[2 marks]** What is the size of the array (in bytes) that carr points to after the first line?

5

(b) **[2 marks]** What is the size of the array (in bytes) that darr points to after the last line?

15

Question 7. Consider the following C code snippet: **[4 marks]**

```
enum { Acura, Audi=3, Buick=5, Cadillac } myCar = Buick;
```

(a) **[2 marks]** What is the value of Cadillac?

6

(b) **[2 marks]** What is the value of myCar?

5

Question 8. What is the output of the following program? **[2 marks]**

```
#include<stdio.h>

union myUion {
    float y;
    char c;
} v;

main()
{
    v.y = 10.5;
    printf("%d", var.c);
}
```

Garbage value

Question 9. Consider the following C code snippet: **[2 marks]**

```
union u {
    char c[10];
    int i;
    float f;
} u1;
```

What is the size allocated to the variable u1? Express your answer in terms of sizeof(type), where type is the appropriate type.

Max(sizeof(c), sizeof(i), sizeof(f))

Question 10. Consider a singly-linked list which contains a list of integers. A node in this list is defined as follows: **[7 marks]**

```
struct node
{
   double data;
   struct node *next;
};
```

Suppose that head points to the head of the list. Suppose further the list contains the integers 60.5, 16.0, 52.1, 94.0, and 15.3, where 60.5 is at the head of the list.

(a) **[2 marks]** What is the value of head->data?

60.5

(b) **[2 marks]** What is the value of head->next->data?

16.0

(c) **[3 marks]** What is the output of the following code snippet?

```
Node *p = head;
while(p != NULL)
{
    printf("%d ", p->data);
   p = p->next;
}
```

60.5 16.0 52.1 94.0 15.3

Question 11. Consider the following C program: **[10 marks]**

```
#include<stdio.h>

int a;

int func(int i)
{
    static int b = 2;
    b++;

    return a+b;
}

int main(void)
{
    int d = -1, e;
    func(d);
    e = func(++d);
     printf ("%d", e);
    return 0;
}
```

(a) **[2 marks]** What is storage class of variable b?

static

(b) **[2 marks]** What is the lifetime of variable b?

static

(c) **[2 marks]** In which memory segment is the variable d stored?

Stack Segment

(d) **[2 marks]** What is the initial value of the variable a?

zero

(Question 11 continued on next page)

(Question 11 continued)

(e) **[2 marks]** What is the output of the program?

```
4
```

* * * * * * * * * * * * * * *

Student ID: .....

SPARE PAGE FOR EXTRA ANSWERS

Cross out rough working that you do not want marked.
Specify the question number for work that you do want marked.