Homework 2- Solutions

1. 16= 2^4, Therefore addressing bits=$\log_2(2^4)$=4

2. Address may be different we have to just see the logic.

57, 100, 100, 104
57, 104, 104, 108
57, 108, 108, 112
57, 112, 112, 116
57, 112, 116, 120
57, 100, 108, 124
57, 120, 124, 128

3.

a. 0000110110000000
b. 00011000
c. 0000011101100010
d. 1000000111001000

4. a. $1.010100011 \text{ X } 10^{1001}$

b. $1.00110000111 \text{ X } 10^{1011}$

5. (B) $1.2 \text{ X } 10^1$

Base(decimal) : 1.1 = $2^0 + 2^{-1}$ = 1 + 0.5 = 1.5, Exponent(decimal) : 11 = $2^1 + 2^0$ = 2 + 1 = 3. Therefore, x = 1.5 * 8 = 12 = 1.2 * 10^1

6.

i)43 bytes
ii)43 bytes

7.

```
const int i = 2;  // No error
const int j = i+10;  // No error
i++;    // This leads to Compile time error
```

8.

```
#include <simplecpp>
main_program
{
    float base,exp,val=1;      //val should be float too, to avoid loss of precision
                               //initial value of val to be assigned, to avoid garbage output
    cout<<"Enter base: "<< endl;   //closing quotation marks
    cin >>base;
    cout<<"Enter exponent: "<<endl;
    cin>> exp;                    // variable can't be declared in this statement
    repeat(exp)
    {
      val=val*base;              //multiplication denoted by * and not x
     }
    cout<<"Value is: "<<val;
 }
```

9. (D) _onevar

1st name starts with '1', so it is invalid (Names in C++ cannot start with 0-9)

2nd name is a C++ keyword, so it is also invalid.

3rd name contains '&', so it is also invalid.

4th name is valid. (Names in C++ can start with '_')

10. a) Incorrect, different data types can not be declared in a single statement.

b) Incorrect, const variable value can't be change in program

c) Correct,ASCII value of 'a' will be stored in "i"

d) Incorrect, char data type will take single character only. If you want to give direct ASCII value, then do not use single quotes.

e) Incorrect, Modulo operation is not defined for floating numbers.

11.

a - reserved keyword
e - variable name cannot begin with a number
g - space are not allowed
i - ‘-’ are not allowed

12.

Valid: Name, name_1, _ADD, Identifier
Invalid: add 1, int, no^3

13. CS101

14.

```
#include<simplecpp>
main_program{
char cl, cu;
cin >> cl;
cu = cl + ’A’ - ’a’;
cout << cu << endl;
}
```

15.

a. p-48 (or) p-'0' becoz ‘0’=48(ASCII value of zero)
b. q-48 (or) q-'0'
c. 10*i+j

16.

Reason: 0.1 cannot be represented exactly in binary notation.
Lesson Learnt: Be careful whenever your program involves arithmetic with floating numbers. They are are generally inaccurate.

17.

16

16
16
16.667

18. (C) 5.5

int a=020 is NOT a decimal number. Starting a number with 0 indicates that it is an octal number.

(020)8 = (16)10. Hence, 16 - 10.5 = 5.5

19. C. Statement i=i+3 execute each time for first declaration of i(i=15) and other are usual.

20.

```
#include<simplecpp>
main_program
{
        int height, inches, feet;

        cout << "Enter height in cm: " << endl;
        cin >> height;

        inches = height/2.54;
        feet = inches/12;
        inches = inches%12;

        cout << "Height is: " << feet << "feet and " << inches << "inches";
}
```

21.

```
#include <simplecpp>
main_program{
        int a, b;
        cin >> a >> b;
        int ans = 1;
        repeat(b){
                ans = ans*a;
        }
```

```
        cout << ans << endl;
    }
```

22.

(A)- digits
(B)- (num%10)
(C)- (num/10)

Each iteration of repeat extracts the rightmost digit of the number and the reverse variable is multiplied by 10 at each step to:-

multiply the first extracted digit to be successively multiplied by 10 (digit -1) times
multiply the second extracted digit to be successively multiplied by 10 (digit -2) times and so on… to get the required reverse number.

num = num/10 is added so that num=num%10 can successfully extract the digits in order from the right at each step.

Please take an example and work it out for further clarity.

23.

```
int a = 10;
int b = 20;
a = a+ b; //now a is 30 and b is 20
b = a -b; //now a is 30 but b is 10 (original value of a)
a = a -b;now a is 20 and b is 10, numbers are swapped
```

24. 5

25.
Units digit= (x%10)

26.

```
a = a+b;
```

```
b = a-b;
a = a-b;
```

27.

```
#include <simplecpp>
main_program
{
float x,n,f=1,fact=1,value=1,term=1;

cout << "Finding e^x using Taylor series. Enter value of x: " << endl;
cin >> x;
cout << "Enter value of n in series: " << endl;
cin >> n;

repeat(n)
{
        term=term*x;
        fact=fact*f;
        f=f+1;
        value = value+(term/fact);
}

cout << "Value of e^" << x << " is: " << value;
}
```

28.

```
#include<simplecpp>
main_program
{
        int i=1;
        repeat(100)
        {
                cout<<i*i<<endl;
                i=i+1;
```

```
        }
    }
```

29. No

If a number(x) terminates in base 2 (binary) then there exists natural numbers a and b such that $x = a/2^b$ or $x = (a * 5^b)/(10^b)$ so, there exists natural numbers c and b such that $x = c/10^b$ which means that x has to be terminating in base 10 (decimal) too

30.

(A)- rows
(B)- rows - i - 1
(C)- i+1
(D)- (i-k)/(k+1)
The outermost repeat is for the no. of rows to be printed.
The first inner repeat prints the varying no. of spaces to be printed at the front of each row.
The second inner repeat prints the numbers in each row. Note that nCk = n!/(n-k)!k!