Dept of Electronics &Communications First Year
C++ programming second term 2020/2021 Sheet #4 structures
Instructor: Prof. Neamat Abdelkader

1] Choose the correct answer:

1- Which of the following accesses a variable var in structure b?
A. var=10;
B. b.var=10;
C. b-var=10;
D. b>var=10;

2. Which of the following is a properly defined struct?
A. struct {int a;}
B. struct a_struct {int a;}
C. struct a_struct int a;
D. struct a_struct {int a;};

3. Which properly declares an object t1 of struct test?
A. struct test { };t1;
B. struct t1;
C. struct test t1;
D. test t1;

4- Which of the following is a properly defined struct?
A. struct {int a;}
B. struct a_struct {int a;}
C. struct a_struct int a;
D. struct a_struct {int a;};

5. Which of the following statements is true about C++ Structs?
A. All members must be the same type
B. Members can be initialized on one line of code
C. Each member must be passed individually
D. Functions cannot accept Structs as parameters

6. What will happen when the structure is declared?
A. it will not allocate an memory.
B. it will allocate the memory
C. it will be declared and initialized
D. none of the mentioned

2] Correct the following program:

```
 struct s1 {   int a;  float b; } new1;
                                      struct
struct g1 {  double c; double d;   s1 new3;    } new2;

int main()
    {
        cout << sizeof(new1) << endl;
        new1.a=100;
        new1.d=200;
        new3.c=70;
        new1.d=50;
        new2.d = 17;
        new3.c = 20;
        new2.new3.a=90;return 0;}
```

IMP **3] Choose the correct answer with explanation**?

```
1- struct emp {    int ecode;     struct emp e;  };
```

Infinte loop

A. Error: in structure declaration
B. Linker Error
C. No Error
D. None of above

IMP

```
2- int main()
{    struct emp    {       char n[20];       int age;    };
    struct emp e1 = {"Mohammed", 23};
    struct emp e2 = e1;
    if (e1 == e2)
        cout<<"The structure are equal";     return 0; }
```

this is char array inziallization

struct can be equalized to move data

A. Prints: The structure are equal
B. Error: Structure cannot be compared using '=='
C. No output
D. None of above

```
3-  main()
{    struct emp    {       char name[25];       int age;       float bs;    };
    struct emp e;
    e.name = "Amr";
    e.age = 25;
    cout<< e.name << “  “<<e.age;   }
```

A. Error: incompatible types in assignment
B. Error: invalid constant expression
C. Error: value required
D. No error, Output: Amr   25

```
4-  int main()
      {       struct str{
              char str[10];
              int a;      };
      str    h2={"IHelp",10};
       h1=h2;
          h2.str[1]='h';
          cout<<h1.str<<"  "<<h1.a;      return 0;}
```

A. Error in initialization of structure

B. Error in assigning of structures

C. Error in changing characters in string of structure

D. No error.

4] Show the output of the following programs:

```
a- #include <iostream>
   using namespace std;
   struct Time
   {         int hours;
       int minutes;
       int seconds;    };
   int toSeconds(Time now);

       int main()
   {       Time t;
       t.hours = 5;
       t.minutes = 30;
       t.seconds = 45;
       cout << "Total seconds: " << toSeconds(t) << endl;
       return 0;      }
   int toSeconds(Time now)
   {         return 3600 * now.hours + 60 * now.minutes + now.seconds;      }
```

```
Total seconds: 19845
```

```
b- struct example{  string s; int h,n; };

 int main( )
{ example   st1, st2;
   st1.s="computer logic and c++";
         st2.s=st1.s.substr( 9,5);
         cout<<" string st1   "<<st1.s<<endl;
   st1.n=st1.s.length(); cout<<"  length of st1 string   "<<st1.n<<endl;
         cout<<" string st2   "<<st2.s<<endl;
         st2.n=st2.s.length(); cout<<"  length of st2 string   "<<st2.n<<endl;
          int i=1;
st1.h=st1.s.find("c"); cout<<"  character  no. "<<i<<" is found at  "<<st1.h<<endl;
while(st1.h>=0)      {i++;
 st1.h=st1.s.find("c",st1.h+1);
cout<<"  character  no. "<<i<<" is found at  "<<st1.h<<endl; }}
```

```
string st1 computer logic and c++
 length of st1 string    22
string st2  logic
 length of st2 string   5
charcter no.  1  is found at  0
charcter no.  2  is found at  13
charcter no.  3  is found at  19
charcter no.  4  is found at  ?
```

```
c- const int max_size=100;
         struct vector {int   size, n, x [20];} ;
```

void can contain return

```
void set (vector & array ){ array.n=-1; array.size=0;}
void insert ( vector & array, int a) {array.n++; if (array.size > max_size) return;
array. x[array.n]=a; array.size++;  }
int get ( vector & array, int i) { return array. x[i];  }

        main( )
        {         vector A, B; cout<<"  creat new vectors  " <<endl;
          set(A);  set(B);  cout<< "  legnthes  "<<A. size<<"    "<<B. size<<endl;
    insert (A, 10); insert (A, 50); insert (A, 70); insert(A, -20);
    insert (B,77); insert(B, 33);  insert(B, -5);
          cout<< "  legnthes  "<<A. size<<"    "<<B. size<<endl;
        for(int i=0; i<A.size; i++) cout<< get(A, i) <<"      ";
      cout<<endl; for(int i=0; i<B.size; i++) cout<< get(B, i)<<"      ";
      cout<<endl; }
```

```
create new vectors
legnthes 0 0
legnthes 4 3
10 50 70 -20
77 33 -5
```

Read -> cin , data entry

5] Use the declared **structure student** that contains the name, student number, number of subjects, and degree in all subjects. Then write main program that contains array of 100 structures of the type student as **global data** and do the following:

i) Read the data of all students using the function enter( ) to read the data of certain student according to his index

ii) Search for certain student using the function search( ) that searches for a student according to his name. If the student was found, let the program prints the student name and the scores of the student.

Struct student { char name [30]; int number , n_course; float degree[ ] };

u forget this cindition

6] You are designing an automated library catalog system. The library contains 50,000 books. For each book, there is a catalog entry consisting of the call number (up to 10 characters), number of copies in library, the author (up to 40 characters), the title (up to 100 characters), and description of content (up to 300 characters).

a) Write the structure declaration necessary for this information
b) How many bytes of memory space are required for one book (assume an integer needs 4 bytes).   484 byte
c) Write a function that reads information for a book into a structure passed as parameter to the function.

7] Write a structure to hold a fraction. The struct should have an integer numerator and a integer denominator member. Declare 2 fraction variables and read them in from the user. Write a function called multiply that takes both fractions, multiplies them together, and prints the result out as a decimal number.

dont forget casting to float