CSC 111—Fall 2013
Quiz 6 Solutions

1. What is the output of the following syntactically correct C program?

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
     typedef struct {
     int day;
     char month [10];
     int year;
     } Date;

int main(void) {
     Date dob;
     strcpy(dob.month, "January");
     dob.day = 05;
     dob.year = 1987;
     dob.month[4] = 'X';
     printf("Birthday: %d %s %d \n", dob.day, dob.month,
             dob.year);
     return EXIT_SUCCESS;
} /*main*/
```

a. Birthday: 5 JanuXary 1987
b. Birthday: 5 XJanuary 1987
c. Birthday: 5 JanuXry 1987
d. Birthday: 5 JanuaXry 1987

2. Which of the following correctly defines a structure type "Point"?

a. structure { int x; int y; } Point;
b. typedef struct {int x, y; } Point;
c. typedef struct Point {int x, y }
d. struct Point (int x, y;);

3. Given the struct type `Date` below, which of the following options initializes the `day` element of the variable `order_date` properly?

```
typedef struct {
       int day;
       int month;
   int year;
} Date;

Date order_date;
```

a. `struct order_date.day ={9,};`
b. `static order_date.day = "9";`
c. `order_date.day ={9};`
d. `order_date.day = 9;`

4. Consider the following syntactically correct C program. Indicate which of the given `printf()` statements when placed in `main()` as specified will generate the output `101 A 8.75`

```
#include <stdio.h>
#include <stdlib.h>
typedef struct {
     char grade;
     float gpa;
 } StudentInfo;
 typedef struct {
     int id;
     StudentInfo p;
} Student;

int main(void)  {
       Student Steven = {101, {'A', 8.75}};
       /* printf statement goes here */
       return EXIT_SUCCESS;
} /*main*/
```

a. printf("%d %c %g", Steven.id, Steven.StudentInfo.grade, Steven.StudentInfo.gpa);
b. printf("%d %c %g", Steven.id, Steven.p.grade, Steven.p.gpa);
c. printf("%d %c %g", Steven.id, Steven.struct.p.grade, Steven.struct.p.gpa);
d. printf("%d %c %g", Steven.id, p.grade, p.gpa);

5. Which one these declarations is a syntactically correct C type declaration?
   a. `typedef Item float;`
   b. `typedef index int;`
   c. `typedef int boolean;`
   d. `typedef float Vector[100, 100];`

6. What is the difference between a struct and an array?

   a. There is no difference between the two.
   b. A struct groups elements of the same data type while an array groups elements of different data types.
   c. Arrays store only integers while structures store integer and string variables.
   d. An array groups elements of the same data type while a struct groups elements of potentially different data types.

7. Assume the following syntactically correct C declarations and statements:

```
int k = 7;
int* ptr1;
int* ptr2;
ptr1 = &k;
ptr2 = ptr1;
int** ptr3 = &ptr2;
```

   Which of the following statements outputs the value 7?

   a. `printf("%d\n", *(&k));`
   b. `printf("%d\n", *ptr2);`
   c. `printf("%d\n", **ptr3);`
   d. All of the above

8. Which of the following code fragments accesses a `struct` field called `access` in a `struct` identified by variable `z` in the programming language C?

   a. `z-access`
   b. `z->access`
   c. `z>access`
   d. `z.access`

9. What is the output of the following syntactically correct C program?

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

#define VSIZE   (3)
typedef int Item;
typedef int Index;
typedef Item Vector[VSIZE];

void initVector(Vector V, Index size) {
     Index k;
     for (k=0; k<size; k++) V[k] = (Item)k;
} /*initVector*/

void printVector(Vector V, Index size) {
     Index k;
     for (k=0;  k<size;  k++) printf("%d ",  V[k]);
     printf("\n");
} /*printVector*/

int main(void) {
     Vector Vec;
     initVector(Vec, VSIZE);
     printVector(Vec, VSIZE);
     return EXIT_SUCCESS;
} /*main*/
```

a. 1 2 3

b. 0 1 2

c. 1 1 1

d. 0 0 0

10. Which of the following code fragments accesses a `struct` field called `access` in a `struct` identified by `*p` in the programming language C?

a. `p.access`

b. `p-access`

c. `p->access`

d. `p>access`

11. What is the output of the following syntactically correct C program?

```
#include <stdio.h>
#include <stdlib.h>
int main(void) {
      typedef int arr[10];
      arr b = {1, 6, 3};
      printf("%d", sizeof(b));
      /* sizeof() function returns the size of the parameter */
      /* Assuming size of int as 4 bytes */
      return EXIT_SUCCESS;
} /*main*/
```

a. 12

b. 40

c. 4

d. 80

12. In the programming language C, when is memory allocated for a `struct`?

a. At the point where `struct` type name is declared.

b. At the point where a variable of the `struct` type is declared.

c. When the variable of this `struct` is used in the program.

d. None of the above is correct.

13. Which of the following code fragments properly accesses a `struct` field called `id` in the `struct Student` identified by variable `firstStudent` in the C programming language?

```
typedef struct {
      int id;
      float gpa;
      char name[20];
}  Student;
```

a.
```
struct Student firstStudent;
firststudent.id = 12345;
```

b.
```
Student firstStudent;
firstStudent.id = 12345;
```

c.
```
Student firstStudent;
firstStudent->id = 12345;
```

d.
```
Student.firstStudent.id = 12345;
```

14. What is the effect of the following syntactically correct C program?

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

#define ROWS  (4)
#define COLS  (3)
typedef double Matrix[ROWS][COLS];
typedef int Index;

void printArray(Matrix a, Index rows, Index cols) {
     Index k, j;
     for (j=0;  j<rows;  j++) {
          for (k=0;  k<cols;  k++)
               printf("%.1f  ", a[j][k]);
          printf("\n");
     } /* for */
     printf("\n");
} /*printArray*/

void initArray(Matrix a,  Index rows,  Index cols) {
     Index k, j;
     for (j=0;  j<rows;  j++)
          for (k=0;  k<cols;  k++)
               a[j][k] = (double)(j+k);
} /*initArray*/

int main(void) {
     Matrix mat;
     initArray(mat, ROWS, COLS);
     printArray(mat, ROWS, COLS);
     return EXIT_SUCCESS;
} /*main*/
```

a.
```
1.0  2.0  2.0
2.0  4.0  3.0
3.0  5.0  4.0
4.0  4.0  5.0
```

b.
```
0.0  1.0  2.0  3.0
1.0  2.0  3.0  4.0
2.0  3.0  4.0  5.0
```

c.
```
0.0  1.0  2.0  3.0
4.0  5.0  6.0  7.0
8.0  9.0  10.0 11.0
```

d.
```
0.0  1.0  2.0
1.0  2.0  3.0
2.0  3.0  4.0
3.0  4.0  5.0
```

15. Which line in the following C program will generate a syntax error?

```
#include <stdio.h>                          // Line 1
#include <stdlib.h>                         // Line 2
int main(void) {                            // Line 3
     typedef struct {                       // Line 4
          int coordinates[2];               // Line 5
     } Center_of_circle;                    // Line 6
     typedef struct circle_parameters {     // Line 7
          Center_of_circle center;          // line 8
          float radius;                     // Line 9
     } circle;                              // line 10
     circle c1;                             // line 11
     c1.radius = 3.5;                       // Line 12
     c1.center.coordinates[2] = {5, 5};     // line 13
     printf("radius = %.1f\n", c1.radius); // Line 14
     return EXIT_SUCCESS;                   // Line 15
}/*main*/                                    // Line 16
```

a. line 8

b. line 10

c. line 11

d. line 13