

1. In grid below, assume that each square represents a space and each row represents a line on the screen. Then show how the output of the following program will be displayed.

```
#include <stdio.h>
int main(void)
{
    double i = 99.869;
    int j = -124;
    printf("%6.0f%8d\n", i, j);
    printf("%5.1f%9.5f\n", i, i);
    return 0;
}
```

			1	0	0					-	1	2	4						
	9	9	.	9		9	9	.	8	6	9	0	0						

2. For the following code segment, show what is in memory, crossing out old values when they are replaced by new ones.

```
int p = -5;
int q = 7;
int r = 9;
int s = 34;
int t = 0;
int u = 2;
double a = 0.0;
double b = 0.0;
double c = 4.95;
p = p + 1;
p = p + 2;
r = q;
s = q / u;
a = q / u;
b = (double) q / u;
t = c;
c = (double) ( u / q );
```

MEMORY

p	-5	-4	-2		
q	7				
r	9	7			
s	34	3			
t	0	4			
u	2				
a	0.0	3.0			
b	0.0	3.5			
c	4.95	0.0			

3. #include <stdio.h>
int main()
{
 double q = sqrt(2.0);
 printf("%d\n", q);
 return 0;
}

a) The above complete program gives a syntax error when you run it. How can you fix this error?

"sqrt" is a function in the math library. We should add a preprocessor directive #include <math.h>

b) After you fix the error, this time it gives the wrong answer for the square root of 2. Why does it give the wrong answer?

"sqrt" is a function in the math library. We should add a preprocessor directive #include <math.h>

```

4. char x, y;
   char a, b;

   printf("Enter some characters:");
   scanf("%c%c", &x, &y);

   printf("x=%c\ny=%c\n", x, y );

   printf("Enter some more characters:");
   scanf("%c%c", &a, &b);

   printf("a=%cb=%c\n", a, b );

```

```

x = H
y = i
a =
b = H

```

After running the above code segment, the user enters the following input:

```

Enter some characters:
Hi
Enter some more characters:
Hello

```

What will be the output?

5. The following pseudocode computes the factorial $n!$ of a given non-negative integer n , and saves it in the variable nf , but the modification step is missing in the dotted space. (Mathematically, $n! = n(n - 1)(n - 2) \cdots 1$. $0! = 1$)

1. Get a non-negative integer n
2. $nf \leftarrow 1$;
3. $i \leftarrow 1$;
4. while ($i \leq n$) do
 - {
 - 4.1
 - 4.2
 - }
5. display nf

a) Write down the missing statements.

```

nf = nf * i;
i ← i+1;

```

b) Show the initialization step for the loop.

```

nf ← 1;
i ← 1;

```

c) Show the test step for the loop.

```

i ≤ n

```

d) Rewrite the pseudocode by using a repeat-until structure instead of a while do structure.

```

nf ← 1;
i ← 1;
repeat {
    nf = nf * i;
    i ← i+1;
} until (i > n)

```

6. DO NOT WRITE THIS PROGRAM. Write a **pseudo-code** for an algorithm that will ask prices of several items. After the last price is entered, the sentinel amount of -1 is entered. The algorithm should calculate the number of items purchased, total cost of the purchase before tax and with the tax of 7.5%, and display the results on the screen.

Calculating_Cost

1. num_items \leftarrow zero, cost \leftarrow zero
 2. get price
 3. WHILE (price is NOT -1){
 - 3.1 cost \leftarrow cost + price
 - 3.2 num_items \leftarrow num_items + 1
 - 3.3 get price
 4. } ENDWHILE
- tax = cost * 0.075
total_cost = cost + tax
display num_items, cost, total_cost

7. What output is produced by the following program?

```
int main()
{  int a=2, b=2, c=2;
   if ((++a > b++) && (b > c))
       printf("sorted");
   else if ((a==b) && (b==c))
       printf("all equal");
   else printf("unsorted");
```

sorted

8. What is the output of the following code fragment?

```
int a = 2, k, sum;
while (a<=6){
    for(k=a; k < a+2; k++)
        sum = a+k;
    a = a + 2;
}
printf("a=%d, k=%d, sum=%d\n", a, k, sum);
```

a=8, k=8, sum=13

9. What is the output of the following program segment?

```
int x = 1, y = 4;
while (x <= y)
    switch (y % 2) {
        case 0 : x = x + 1;
        case 1 : y = y - 1;
    }
printf("x=%d y=%d\n",x,y);
```

x=3 y=1

10. Show the output produced by the following program:

```
main() {
    int x = 3 ;
    int y = 5 ;
    printf("x=%d y=%d\n", ++x, y--);
}
```

x=4 y=5

11. You are given the following for loop:

```
for(int i=0;i<6;i++)  
    printf("i=%d\n",i);
```

Rewrite it using a while loop.

```
int i = 0;  
while (i<6){  
    printf("i=%d\n",i);  
    i++;
```

12. What is the output of the following program fragment:

```
{  
    int lcv;  
    for (lcv = 1; lcv<=8; lcv++){  
        printf ("%d\n", lcv);  
        lcv = lcv + 2;  
    }
```

1
4
7

13. Write a PROTOTYPE for a C function called q_ball that takes three parameters: a char, a double, and an int, in that order. The function returns an int.

```
int q_ball (char, double, int) ;
```

14. Write a C function called product, that takes two double parameters and returns a double that is the product of the two inputs.

```
double product (double x, double y)  
{  
    return x*y;  
}
```

15. Write a function that, given an integer X, returns 1 if and only if X is a multiple of 13, otherwise returns 0.

```
int function (int x)  
{  
    if(x%13 == 0)  
        return 1;  
    else  
        return 0;  
}
```

16. What values are printed out by the following C program?

```
#include <stdio.h>  
int confusion(int x, int y) {  
    x = 2*x + y;  
    return x; }  
  
int main(void) {  
    int x = 2, y = 5;  
    y = confusion(y, x);  
    x = confusion(y, x);  
    printf("%d\n%d\n", x, y);  
    return 0; }
```

26
12

17. What is the output of the following program?

```
#include <stdio.h>  
int f(int n)  
{  
    int value;  
    if (n == 0) value = 1;  
    else value = 2 * f(n-1);  
    printf("%d\n", value);  
    return value;  
}  
void main()  
{  
    f(3);  
}
```

1
2
4
8

18. What will the following program segment print?

```
void foo(int x);  
int a;  
static int b = 1;
```

```
int main() {  
    int a;  
    for (a = 0; a < 2; a++)  
        foo(a);  
    return 0; }
```

```
void foo(int x){  
    static int y = 2;  
    int z = 3;  
    a++; b++; x++; y++; z++;  
    printf("a=%d b=%d x=%d y=%d z=%d\n", a, b, x, y, z);}
```

a=1 b=2 x=1 y=3 z=4
a=2 b=3 x=2 y=4 z=4

19. What is printed by the following program?

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

double scale(double x, int n);
int main(void)
{
    double x,y;
    int n;
    x=1.2345;
    y=5.4321;
    n=2;
    if ( (x-y) > 0.0)
        y=x;
    else if (( x+y) > 0.0)
        y=y + 1.0;
    else
        y= -y ;
    printf("%.2f\n", scale(x,n));
    printf("%.2f\n",
scale(x*10,n+1));
    printf("%.2f\n", scale(y,3));
    printf("%.2f\n",
scale(scale(y,2),2));
    return 0;
}

double scale(double x, int n)
{
    return(x * pow(10,n));
}
```

Your Answer:

123.45
12345.00
6432.10
64321.00

20. What is printed by the following program?

```
#include <stdio.h>
int numbers (int);
int main()
{
    int x,y;
    x=2;
    y=numbers(x)+10;
    printf("x=%d , y=%d\n",x,y);
    printf("Number is
%d\n",numbers(numbers(10)));
    return 0;
}

int numbers(int x)
{
    x=x+1;
    printf("In numbers x=%d\n",x);
    return x;
}
```

Your Answer:

In numbers x=3
x=2 y=13
In numbers x=11
In numbers x=12
Number is 12

