PROGRAMMING IN JAVA

Assignment 00

TYPE OF QUESTION: MCQ

Number of questions: 20 Total marks**: 20 × 1 = 20**

QUESTION 1:

If the sequence of numbers 2, 6, 12, 20, 30... continues in the same pattern, what will be the 7th term in the sequence?

a. **42**

b. **48**

c. **56**

d. **72**

Correct Answer:

c. **56**

Detailed Solution:

The sequence follows the pattern n(n+1). For the 7th term, the calculation is 7 * (7 + 1) = 56.

QUESTION 2:

What is the following set of statements equivalent to?

```
if(x==1)
{
    x=0;
}
else if(x==0)
{
    x=1;
}
```

a. x = 1 - x

b. x = x - 1

c. x = 1 + x

d. x = 1 % x

Correct Answer:

a. x = 1 - x

Detailed Solution:

The code inverts the value of x (0 becomes 1, 1 becomes 0). Using x = 1 - x achieves the same result in a single line.

QUESTION 3:

What is the modulus of the complex number z = 3 + 4i?
(Hint: The modulus of a complex number z = a + bi is calculated as the square root of ($a^2 + b^2$))

a. 3

b. 5

c. 4

d. 7

Correct Answer:

b. 5

Detailed Solution:

The modulus of a complex number z = a + bi is calculated as the square root of ($a^2 + b^2$). The square root of ($3^2 + 4^2$) is 5.

QUESTION 4:

Calculate the dot product of two vectors u=(2,3) and v=(4,-1).

(Hint: The dot product is calculated as (u_1*v_1 + u_2*v_2))

a. 5

b. 7

c. 10

d. 11

Correct Answer:

a. 5

Detailed Solution:

The dot product is calculated as (u1*v1 + u2*v2). Therefore, (2*4) + (3*-1) = 8 - 3 = 5.

QUESTION 5:

If the sequence of numbers 1, 8, 27, 64, 125... continues in the same pattern, what will be the 6th term?

a. **216**

b. **343**

c. **512**

d. **729**

Correct Answer:

a. **216**

Detailed Solution:

The sequence follows the pattern n^3. The 6th term is 6 cubed (6 * 6 * 6), which equals 216.

QUESTION 6:

Consider a logic flow to find the maximum of three numbers (x, y, z).

Step 1: If x > y, then check if x > z. If true, max = x; otherwise max = z.

Step 2: Else (meaning y >= x), check a missing condition.

What is the missing condition to determine if y is the maximum?

a. **if x > z**

b. **if y > z**

c. **if y < z**

d. **if x < z**

Correct Answer:

b. **if y > z**

Detailed Solution:

If x is not greater than y, we must compare y against z. If y > z, then y is the maximum.

QUESTION 7:

A number is considered a "special number" if the sum of the factorial of its digits equals the number itself. Which of the following is a "special number"?

a. **123**

b. **145**

c. **153**

d. **170**

Correct Answer:

b. **145**

Detailed Solution:

The sum of the factorials of the digits of 145 is 1! + 4! + 5! = 1 + 24 + 120 = 145.

QUESTION 8:

Given a 3x3 matrix A where row 1 is [2, -1, 3], row 2 is, and row 3 is [-2, -3, 1], what is the determinant of A?

a. -54

b. 49

c. 54

d. 72

Correct Answer:

d. 72

Detailed Solution:

Using the determinant formula for a 3x3 matrix, the calculation results in 2(4+15) - (-1)(0+10) + 3(0+8) = 38 + 10 + 24 = 72,.

QUESTION 9:

Predict the output of the following pseudocode logic if n=5:

```
Set result = 1
Loop i from 1 to n:
   result = result * (i - 1)
End Loop
Print result
```

a. 0

b. 1

c. 115

d. 120

Correct Answer:

a. 0

Detailed Solution:

In the first iteration of the loop (where i=1), the expression becomes 1 * (1-1) = 0. Since the result becomes 0, all subsequent multiplications result in 0.

QUESTION 10:

In a loop designed to calculate the sum of all even numbers in a range, which condition correctly identifies an even number 'i'?

a. **i % 2 == 1**

b. **i % 2 == -1**

c. **i % 2 != 0**

d. **i % 2 == 0**

Correct Answer:

d. **i % 2 == 0**

Detailed Solution:

The modulo operator (%) returns the remainder of division. If a number divided by 2 has a remainder of 0, the number is even.

QUESTION 11:

What is the sum of the first even numbers?

a. **15**

b. **30**

c. **9**

d. **20**

Correct Answer:

b. **30**

Detailed Solution:

The first 5 odd numbers are 2, 4, 6, 8, 10. Their sum is 30.

QUESTION 12:

If x = 5, what will x be after executing:

```
x = x * 2;
x = x - 3;
```

a. 7

b. 10

c. 5

d. 13

Correct Answer:

a. 7

Detailed Solution:

First x = 5 × 2 = 10, then x = 10 - 3 = 7.

QUESTION 13:

Which condition checks if a number x is odd?

a. **x % 2 == 1**

b. **x / 2 == 0**

c. **x % 2 == 0**

d. **x % 2 != 0**

Correct Answer:

a. **x % 2 == 1**

Detailed Solution:

An odd number leaves a remainder 1 when divided by 2.

QUESTION 14:

What is the modulus of the complex number $z = 8 + 6i$?

a. **10**

b. $\sqrt{64}$

c. $\sqrt{102}$

d. $\sqrt{36}$

Correct Answer:

a. **10**

Detailed Solution:

The modulus of a complex number $z = a + bi$ is given by $\sqrt{a^2 + b^2}$.
For $z = 4 + 3i$, the modulus is $\sqrt{(8^2 + 6^2)} = \sqrt{64 + 36} = \sqrt{100} = 10$.

QUESTION 15:

If the sequence is 2, 4, 8, 16, what is the next number?

a. **18**

b. **24**

c. **32**

d. **36**

Correct Answer:

c. **32**

Detailed Solution:

Each term is multiplied by 2; 16 × 2 = 32.

QUESTION 16:

Given 3 numbers x, y and z. In order to find the minimum using if-then-else:

```
if ______ then #MISSING

    if x < z
        min = x
    else
        max = z
else
    if y < z then
            min = y
    else
        max = z
```

What should be placed in _____ ?

a. `if y > z then`

b. `if y < z then`

c. `if x > z then`

d. `if x < y then`

Correct Answer:

d. `if x < y then`

Detailed Solution:

The correct logic is:

```
if x < y then
    if x < z then
        min = x
    else
        min = z
else
    if y < z then
        min = y
    else
        max = z
```

This compares the first two numbers before checking with the third to find the minimum.

QUESTION 17:

What is the output of the following code for n = 3?

```
result = 0
for i = 1 to n do
 result = result + i
print(result)
```

a. 3

b. 6

c. 9

d. 1

Correct Answer:

b. 6

Detailed Solution:

Sum of 1+2+3 = 6.

QUESTION 18:

Consider the following pseudo-code for calculating the sum of all odd numbers in a range:

```
sum = 0
for i = 1 to n do
    if _________________    #MISSING
        sum = sum + i
```

What condition should be placed in _____?

a. i % 2 == 0

b. i % 2 != 0

c. i % 2 == 1

d. i % 2 == -1

Correct Answer:

b. i % 2 != 0

Detailed Solution:

The condition `i % 2 != 0` checks if the number `i` is odd. Only odd numbers will satisfy this condition, and they will be added to `sum`. Other conditions would result in incorrect logic.

QUESTION 19:

What will be the output of the following pseudo-code if `n = 4`?

```
result = 1
for i = 1 to n do
    result = result * (i-1+1)
print(result)
```

a. 4

b. 8

c. 24

d. 16

Correct Answer:

c. 24

Detailed Solution:

This is factorial of 4: 1×2×3×4 = 24

QUESTION 20:

A function `foo(int)` is defined as follows:

```
int foo(int n) {
    int result = 1;
    for(int i = 2; i <= n; i++) {
        result *= i;
    }
    return result;
}
```

What will be the output of the program if we call `foo(3)`?
Select your option from the following.

a. **The program will result in a compilation error.**

b. **6**

c. **9**

d. **The program will result in a runtime error due to infinite loop.**

Correct Answer:

b. **6**

Detailed Solution:

2×3 = 6; this is a factorial-like computation starting from 2.