

This homework assignment focuses primarily on some of the basic syntax and semantics of C. The answers to the following questions can be determined by consulting a C language reference and/or writing short C programs to test your logic. For the purpose of this assignment, we will stipulate that answers are expected to be consistent with the behavior of the gcc C compiler, used with `-std=c99`. The given code does compile, possibly with warnings.

After you have analyzed the questions and decided what answers you believe are correct, you may find it useful to write some short programs to test your logic. Submit your answers to the Curator quiz collection point OQ01.

For questions 1 through 3, select the value of the given C arithmetic expression. Pay attention to the given declarations, and that the presence of a decimal point indicates a `double`, rather than an `int`.

1. `int a = 2, b = 5;`
`double x = 6.0, y = 8.0;`

Expression: `x / y + a / b`

- | | | |
|--------|---------|------------------|
| 1) 0.0 | 3) 0.75 | 5) None of these |
| 2) 0.4 | 4) 1.15 | |

2. `int a = 2, b = 5;`

Expression: `b / a * a`

- | | | |
|---------|------|------------------|
| 1) 1 | 3) 4 | 5) 6 |
| 2) 1.25 | 4) 5 | 6) None of these |

3. `int a = 3, b = 5, c = 14;`

Expression: `c % b + a % b`

- | | | |
|------|------|------------------|
| 1) 1 | 4) 4 | 7) 7 |
| 2) 2 | 5) 5 | 8) 8 |
| 3) 3 | 6) 6 | 5) None of these |
-

For questions 4 through 7, select the value assigned to the relevant variable, given the declarations:

```
int M;  
double X;
```

4. `X = 5 / 4;`

- | | | |
|--------|------------------------|------------------|
| 1) 0.0 | 3) 1.25 | 5) None of these |
| 2) 1.0 | 4) This is not allowed | |

5. `M = 5 / 4;`

- | | | |
|------|------------------------|------------------|
| 1) 0 | 3) 2 | 5) None of these |
| 2) 1 | 4) This is not allowed | |
-

6. `X = 5 / 2.0;`

- | | | |
|--------|--------|------------------|
| 1) 0.4 | 3) 2.5 | 5) None of these |
| 2) 2.0 | 4) 3.0 | |

7. `M = 5 / 3.0;`

- | | | |
|------|-----------------------|------------------|
| 1) 0 | 3) 2 | 5) None of these |
| 2) 1 | 4) Illegal assignment | |

For questions 8 through 12, assume the following variables have been declared

```
int    M, N;
double X;
char   C;
```

and assume the standard input stream `stdin` contains the following values, separated by single tab characters:

1.2	4.5	A	-46.32
-----	-----	---	--------

Determine the value of the indicated variable after the execution of the given statement; each question is independent, that is, each starts with the stream contents shown above. Note that `'9'` represents the character value (represented in memory as an ASCII code), while `9` represents an integer value.

8. Value of `C` after executing: `scanf("%d %c", &M, &C)`

- | | | |
|-----------------|--------|------------------|
| 1) '4' | 4) '5' | 7) '6' |
| 2) '\t' (a tab) | 5) 'A' | 8) '3' |
| 3) '.' | 6) '-' | 9) None of these |

9. Value of `C` after executing: `scanf("%f %c", &X, &C)`

- | | | |
|-----------------|--------|------------------|
| 1) '4' | 4) '5' | 7) '6' |
| 2) '\t' (a tab) | 5) 'A' | 8) '3' |
| 3) '.' | 6) '-' | 9) None of these |

10. Value of `N` after executing: `scanf("%f %d", &X, &N)`

- | | | |
|------|-------|-------------------|
| 1) 1 | 4) 5 | 7) ASCII for 'A' |
| 2) 2 | 5) -4 | 8) ASCII for '\t' |
| 3) 4 | 6) 6 | 9) None of these |

11. Value of `M` after executing:

```
scanf("%d", &M);
C = (char) fgetc(stdin);
scanf("%d", &M);
```

- | | | |
|------|-------|-------------------|
| 1) 1 | 4) 5 | 7) ASCII for 'A' |
| 2) 2 | 5) -4 | 8) ASCII for '\t' |
| 3) 4 | 6) 6 | 9) None of these |

17. Suppose that the input stream `stdin` contains the IP address: 298.173.41.142

Assuming that the variables `A` and `B` are declared as `ints`, which of the following code fragments will correctly read the second part of the IP address (173) into the variable `B`?

- | | | |
|---|---|------------------|
| 1) <code>scanf("%d", &A);</code>
<code>char ch = fgetc(stdin);</code>
<code>scanf("%d", &B);</code> | 2) <code>scanf("%d %d", &A, &B);</code> | |
| 4) All of the above | 6) 1 and 3 only | 8) None of these |
| 5) 1 and 2 only | 7) 2 and 3 only | |
-

18. What value will the following code print for the variable `B`? (The question is about the value, not formatting.)

```
int A = 0, B = 0;
while ( A < 10 ) {
    A = A + 2;
    B = B + 1;
}
printf("B: %d\n", B);
```

- | | | |
|------|------|------------------------|
| 1) 0 | 4) 3 | 7) 6 |
| 2) 1 | 5) 4 | 8) No value is printed |
| 3) 2 | 6) 5 | 9) None of these |
-

19. What value will the following code print for the variable `B`? (The question is about the value, not formatting.)

```
int A = 0, B = 0;
while ( A <= 10 ) {
    A = A + 2;
    B = B + 1;
}
printf("B: %d\n", B);
```

- | | | |
|------|------|------------------------|
| 1) 0 | 4) 3 | 7) 6 |
| 2) 1 | 5) 4 | 8) No value is printed |
| 3) 2 | 6) 5 | 9) None of these |
-

20. What value will the following code print for the variable `B`? (The question is about the value, not formatting.)

```
int A = 0, B = 0;
while ( A < 1000 ) {
    B = B + 1;
    A = A + 2;
}
printf("B: %d\n", B);
```

- | | | |
|--------|--------|------------------------|
| 1) 0 | 4) 500 | 7) 1000 |
| 2) 498 | 5) 998 | 8) No value is printed |
| 3) 499 | 6) 999 | 9) None of these |
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For questions 21 through 23, consider executing the code fragment:

```
bool A, B, C, D;

// code that assigns values to A, B, C, and D occurs here

if (!A || B) {
    if (C || !D)
        printf("one");
    else if (D)
        printf("two");
    else
        printf("three");
}
else if (C == D)
    printf("four");
else if (C)
    printf("five");
else
    printf("six");
```

21. What of the following sets of values for A, B, C, and D would cause the string "three" to be printed?

- | | A | B | C | D |
|----|----------------|------|-------|-------|
| 1) | true | true | true | true |
| 2) | true | true | true | false |
| 3) | true | true | false | true |
| 4) | true | true | false | false |
| 5) | false | true | true | true |
| 6) | false | true | true | false |
| 7) | false | true | false | true |
| 8) | false | true | false | false |
| 9) | None of these. | | | |

22. What of the following sets of values for A, B, C, and D would cause the string "four" to be printed?

- | | A | B | C | D |
|-----|-------------------|-------|-------|-------|
| 1) | false | true | true | true |
| 2) | true | false | false | false |
| 3) | false | false | false | true |
| 4) | false | true | false | false |
| 5) | All of the above. | | | |
| 6) | 1 and 2 only. | | | |
| 7) | 1, 2, and 3 only. | | | |
| 8) | 2 and 3 only. | | | |
| 9) | 2, 3, and 4 only. | | | |
| 10) | None of these. | | | |

23. What is the logical condition under which the following while loop will terminate?

```
int Alpha = 12, Beta = 5;

while ( Beta + 2 * Alpha < 100 ) {
    // irrelevant
}
```

- 1) $Beta + 2 * Alpha > 100$
- 2) $Beta + 2 * Alpha \geq 100$
- 3) $Beta > 100 - 2 * Alpha$
- 4) $Beta \geq 100 - 2 * Alpha$
- 5) All of these
- 6) 1 and 3 only
- 7) 2 and 4 only
- 8) None of these.

24. What is the logical condition under which the following while loop will terminate?

```
int Beta = 5;

while (Beta > 0 && Beta <= 10 ) {
    // irrelevant
}
```

- 1) $Beta < 0 \ \&\& \ Beta \geq 10$
- 2) $Beta \leq 0 \ \&\& \ Beta > 10$
- 3) $Beta < 0 \ || \ Beta > 10$
- 4) $Beta \leq 0 \ || \ Beta > 10$
- 5) $Beta < 0 \ || \ Beta \geq 10$
- 6) None of these.

25. What value will be printed when the loop terminates? (The question is about the value, not formatting.)

```
int Alpha = 0;
int Gamma = 5;

while (Alpha < 10)
    printf("%d\n", Gamma);
    Alpha++;
printf("%d", Alpha);
```

- | | |
|-------|-------------------------------------|
| 1) 1 | 4) 15 |
| 2) 5 | 5) 12 |
| 3) 11 | 6) The value of Alpha never prints. |