Basic Data Types & Operators - Questions

Question 1:

- Look at the following program. Will both printf calls give the same result?

```c
#include <stdio.h>

int main() {
    char a = 'X';
    printf("a: %c\n", a);
    printf("a: %d\n", a);
    return 0;
}
```

Question 2:

- Explain the output of the following program:

```c
#include <stdio.h>

int main() {
    char a = 88;
    printf("a: %c\n", a);
    return 0;
}
```

Output:

```
a: X
```

Question 3:

- What is wrong with the following program?

```c
#include <stdio.h>

int main() {
    int a;
    scanf("%d", a);
    printf("a = %d", a);
```

```
        return 0;
    }
```

Question 4:

- The following source code can still be compiled. However, what is wrong with it?

```c
#include <stdio.h>

int main() {
    unsigned char a = 256;
    printf("a = %c", a);
    return 0;
}
```

Question 5:

- The following source code can still be compiled. However, what is wrong with it?

```c
#include <stdio.h>

int main() {
    char a = 200;
    printf("a = %c", a);
    return 0;
}
```

Question 6:

- What is wrong with the following program?

```c
#include <stdio.h>

int main() {
    const int x, y;
    x = 10;
    y = 5;
    int a = x + y;
    printf("a = %d", a);
    return 0;
}
```

Question 7:

- What is wrong with the following program? Fix it.

```c
#include <stdio.h>

int main() {
    float x, y;
    printf("x = ");
    scanf("%d", &x);
    printf("y = ")
    scanf("%d", &y);

    int sum = x + y;
    printf("x + y = %d", sum);

    return 0;
}
```

Question 8:

- In the following program, if user inputs 10 to a, the output of a will be 16. Why?

```c
#include <stdio.h>

int main() {
    int a;
    printf("a = ");
    scanf("%X", &a);
    printf("a = %d", a);
    return 0;
}
```

Question 9:

- Why 2 printf functions give different results in the following program?

```c
#include <stdio.h>

int main() {
    int x = 15/3;
    float y = 15/3;
    printf("x = %d\n", x);
    printf("y = %f\n", y);
    return 0;
}
```

Question 10:

- Run the following program. Why y and z hold the same result but x doesn't?

```c
#include <stdio.h>

int main() {
    float x = 16/3;
    float y = 16.0/3;
    float z = (float) 16/3;
    printf("x = %f\n", x);
    printf("y = %f\n", y);
    printf("z = %f\n", y);
    return 0;
}
```

Question 11:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int x = 0;
    printf("1) x = %d\n", ++x);
    printf("2) x = %d\n", x++);
    printf("3) x = %d\n", x);
    return 0;
}
```

Output:

```
1) x = 1
2) x = 1
3) x = 2
```

Question 12:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int x = 5;
    int y = 7;
    y -= x += 3;
    printf("x = %d\n", x);
    printf("y = %d\n", y);
    return 0;
}
```

Output:

```
x = 8
y = -1
```

Question 13:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int a, b;
    a = 1;
    b = 1;
    printf("%d && %d = %d\n", a, b, a && b);
    printf("%d || %d = %d\n\n", a, b, a || b);

    a = 1;
    b = 0;
    printf("%d && %d = %d\n", a, b, a && b);
    printf("%d || %d = %d\n\n", a, b, a || b);

    a = 0;
    b = 0;
    printf("%d && %d = %d\n", a, b, a && b);
    printf("%d || %d = %d\n", a, b, a || b);
    return 0;
}
```

Output

```
1 && 1 = 1
1 || 1 = 1

1 && 0 = 0
1 || 0 = 1

0 && 0 = 0
0 || 0 = 0
```

Question 14:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int a = 7;
    int b = 10;
    int c = a < 10;
    int d = a != 10;
    int e = a == 10;
    printf("c = %d\nd = %d\ne = %d\n", c, d, e);
    return 0;
}
```

Output

```
c = 1
d = 1
e = 0
```

Question 15:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    printf("%d\n", 3 == 3);
    printf("%d\n", 3 != 3);
    printf("%d\n", 3 <= 3);
    printf("%d\n", 3 < 3);
    return 0;
}
```

Output:

```
1
0
1
0
```

Question 16:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int a = 1 && 0;
    int b = 0 || 1;
    int c = !a && b;
    printf("c = %d\n", c);
    return 0;
}
```

- Output:

```
c = 1
```

Question 17:

```c
#include <stdio.h>

int main() {
    int a = 1;
    int b = 0;
    int c = 1;
    int d = 0;
    int e = (a & b) || !(c || d);
    printf("e = %d\n", e);
    return 0;
}
```

- Output:

```
e = 0
```

Question 18:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    long double a;
    printf("%d %d", sizeof a, sizeof(long double));
    return 0;
}
```

Output:

```
12 12
```

Question 19:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int a = 7;
    int b = sizeof(int) == sizeof a;
    printf("b = %d", b);
    return 0;
}
```

Output:

```
b = 1
```

Question 20:

- What might be wrong with data types in the following program?

```c
#include <stdio.h>

int main() {
    int a, b, c;
    printf("input a, b, c: ");
    scanf("%d%d%d, &a, &b, &c)
    printf("average of a, b, c: %d", (a+b+c)/3);
    return 0;
}
```

Question 21:

- Explain output of the following program:

```c
#include <stdio.h>

int main() {
    int x = 10;
```

```c
    printf("%d\n", x);
    printf("%o\n", x);
    printf("%x\n", x);
    printf("%X\n", x);
    return 0;
}
```

- Output:

```
10
12
a
A
```

Question 22:

- What is wrong with the following program:

```c
#include <stdio.h>

int main() {
    int x = 10;
    printf("%D\n", x);
    printf("%O\n", x);
    printf("%X\n", x);
    return 0;
}
```

Question 23:

- Explain input/output at terminal:

```c
#include <stdio.h>

int main() {
    int x = 0;

    printf("intput: ");
    scanf("%d", &x);
    printf("output: %d\n", x);
    printf("output: %o\n", x);
    printf("output: %X\n", x);
    return 0;
}
```

- Input and ouptut at terminal:

```
intput: 10
output: 10
output: 12
output: A
```

Question 24:

- Explain input/output at terminal:

```c
#include <stdio.h>

int main() {
    int x = 0;

    printf("intput: ");
    scanf("%o", &x);
    printf("output: %d\n", x);
    printf("output: %o\n", x);
    printf("output: %X\n", x);
    return 0;
}
```

- Input and output at terminal:

```
intput: 10
output: 8
output: 10
output: 8
```

Question 25:

- Explain input/output at terminal:

```c
#include <stdio.h>

int main() {
    int x = 0;

    printf("intput: ");
    scanf("%x", &x);
    printf("output: %d\n", x);
    printf("output: %o\n", x);
    printf("output: %X\n", x);
    return 0;
}
```

- Input and output at terminal:

```
intput: a
output: 10
output: 12
output: A
```

```
intput: A
output: 10
output: 12
output: A
```