

Problem Set 2

Types, operators, expressions

Problem 2.1

Determine the size, minimum and maximum value following data types. Please specify if your machine is 32 bit or 64 bits in the answer.

- char
- unsigned char
- short
- int
- unsigned int
- unsigned long
- float

Hint: Use sizeof() operator, limits.h and float.h header files

ANSWER:

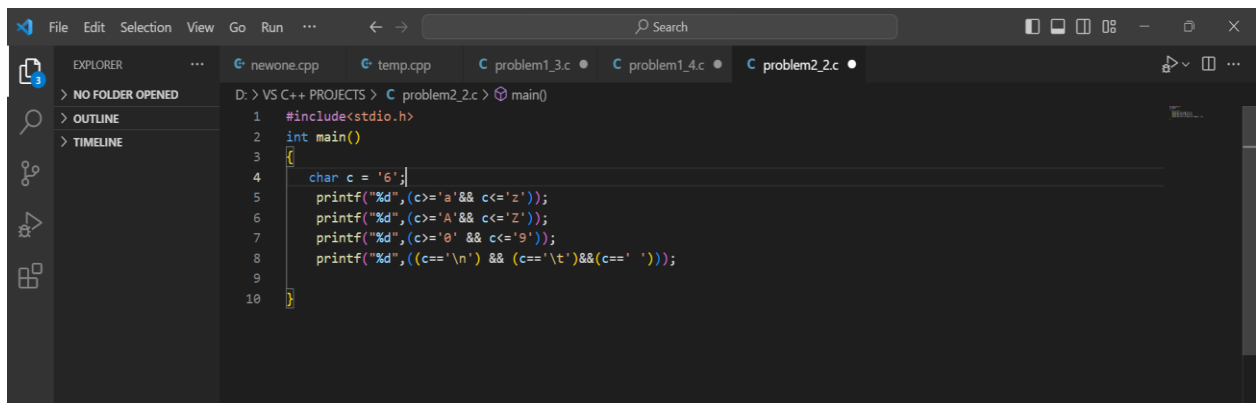
- char 1 byte--128 to 127
- unsigned char 1 byte-- 0 to 255
- short 2 byte--32768 to 32767
- int 4 byte--2147483648 to 2147483647
- unsigned int 4 byte--0 to 4294967295
- unsigned long 8 byte--0 to 18,446,744,073,709,551,615
- float 4 byte--1.17549e-38 to 3.40282e+38

Problem 2.2

Write logical expressions that tests whether a given character variable c is

- lower case letter
- upper case letter
- digit
- white space (includes space, tab, new line)

ANSWER:



```
D:\> VS C++ PROJECTS > C problem2_2.c > main()
1  #include<stdio.h>
2  int main()
3  {
4      char c = '6';
5      printf("%d", (c>='a' && c<='z'));
6      printf("%d", (c>='A' && c<='Z'));
7      printf("%d", (c>='0' && c<='9'));
8      printf("%d", ((c=='\n') && (c=='\t') && (c==' ')));
9  }
10 }
```

Problem 2.3

Consider `int val=0xCAFE`; Write expressions using bitwise operators that do the following:

- test if atleast three of last four bits (LSB) are on
- reverse the byte order (i.e., produce `val=0xFECA`)
- rotate fourbits (i.e., produce `val=0xECAF`)

Problem 2.4

Using precedence rules, evaluate the following expressions and determine the value of the variables(without running the code). Also rewrite them using parenthesis to make the order explicit.

- Assume (`x=0xFF33`,`MASK=0xFF00`).Expression: `c=x & MASK ==0`;

ANS == `c = (x & (MASK == 0))` , `c = 0`, `x = 0xFF33` , `MASK == 0xFF00`;

`x = 1111111100110011` `MASK = 1111111100000000`;

`(MASK == 0)` IS FALSE;

`(x & MASK) = (1111111100000000 & 0000000000000000)` is 0;

So `c` is 0;

- Assume (`x=10`,`y=2`,`z=2`;)Expression: `z=y=x++ + ++y*2`;

ANS `z= 16`, `y = 16`, `x = 3`.

`z = y = (x++) +(++y)*2`

- Assume (`x=10`,`y=4`,`z=1`;)Expression: `y>>= x&0x2 && z`

ANS = `y = 2`;

`y>>=((x & 0x2) && z)`;

`y>>=((10 & 2) && 1)`;

`y>>=1`;

Problem 2.5

Determine if the following statements have any errors. If so, highlight them and explain why.

- `int 2nd value=10`;
Identifier name(variable name) cannot start with the number.
- Assume (`x=0`,`y=0`,`alliszero=1`). `alliszero =(x=1) && (y=0)`;

Assignment operator should be replaced with relationship operator.

For checking values '==' operator is used

For assigning values '=' operator is used

- **Assume (x=10,y=3,z=0;). Y = ++x + y ; z = z-->x;**

Error statement is -->.

Y = ++x + y ; z = (z--) > x

- **Assume that we want to test if last four bits of x are on. (int MASK=0xF;ison=x&MASK==MASK)**

There is nothing wrong in this statement. But we need braces to make the program flow.

ison = (x & MASK) == MASK.