CS 241
Data Organization using C
Variables and Simple Loops

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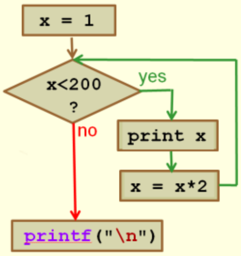


x = 1

x<200 ?

yes

no

print x

x = x*2

printf("\n")

9/5/2019

Cannot Connect to moons.cs.unm.edu

If **`moons.cs.unm.edu`** does not work, try

`trucks.cs.unm.edu`

If neither works,

1. Make sure you are not doing something wrong.
2. Contact CS support:
   - e-mail: cssupport@cs.unm.edu
   - Help Desk - 277-3527

Distributed Computing: When the crash of a computer you've never heard of stops you from getting any work done.

Quiz: '=' Symbol

In The C programming language, the ‘=’ symbol is most accurately read:

a) “Equals”

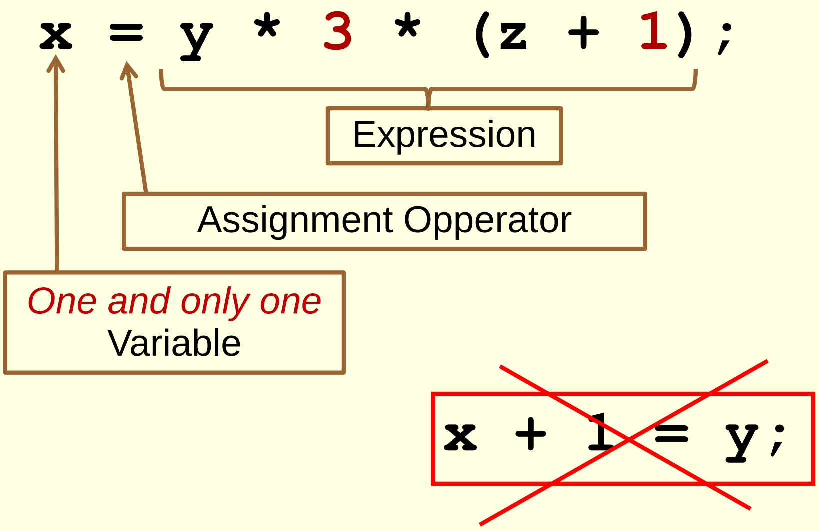
b) “Assign the value of the expression right side to the variable on the left.”

c) “Is equivalent to.”

d) “A mathematical symbol used to indicate equality.”

e) “A conditional symbol used to indicate equality.”

Assignment Statement



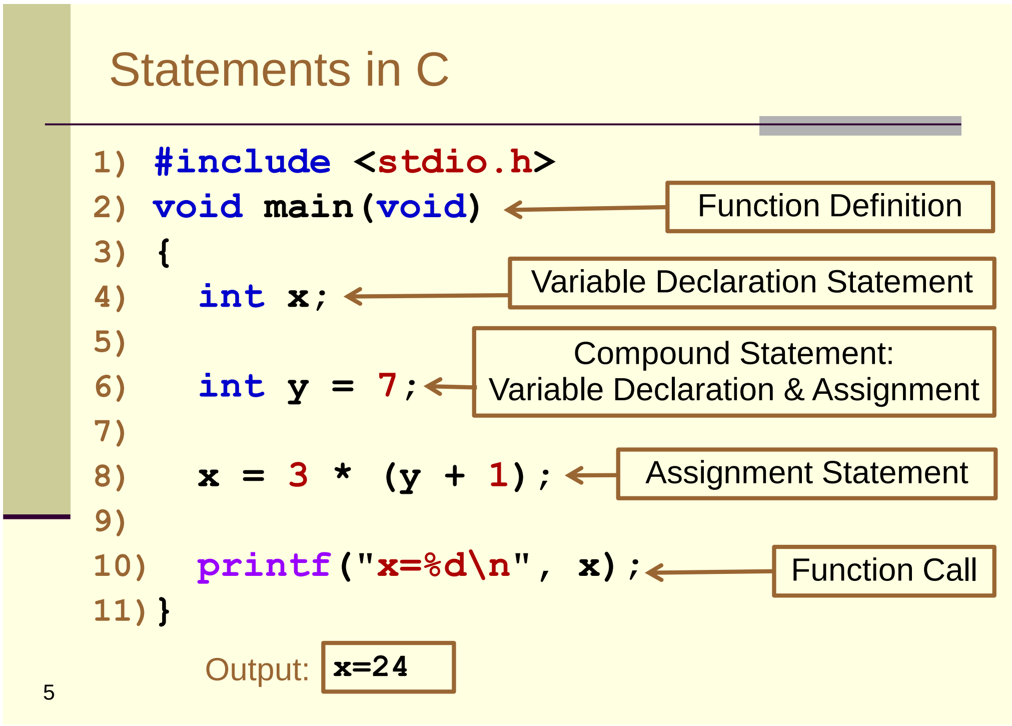
```
x = y * 3 * (z + 1);
```

Expression

Assignment Opperator

One and only one Variable

~~x + 1 = y;~~



Statements in C

```c
#include <stdio.h>
void main(void)
{
   int x;

   int y = 7;

   x = 3 * (y + 1);

   printf("x=%d\n", x);
}
```

Function Definition

Variable Declaration Statement

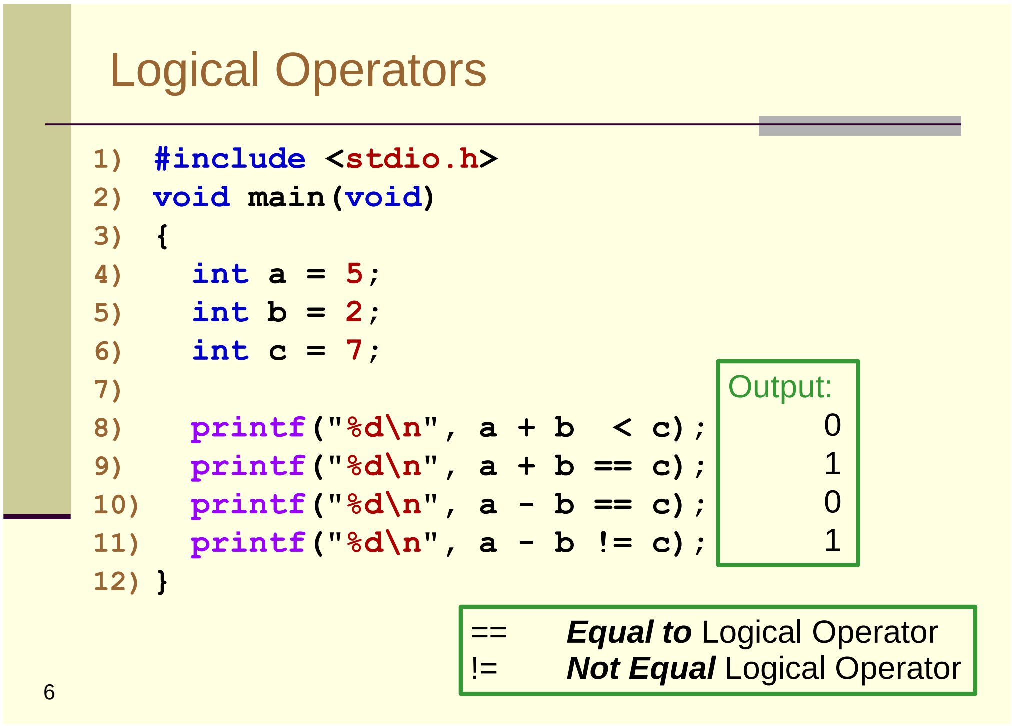
Compound Statement:
Variable Declaration & Assignment

Assignment Statement

Function Call

Output:

```
x=24
```



Logical Operators

```c
#include <stdio.h>
void main(void)
{
  int a = 5;
  int b = 2;
  int c = 7;

  printf("%d\n", a + b  < c);
  printf("%d\n", a + b == c);
  printf("%d\n", a - b == c);
  printf("%d\n", a - b != c);
}
```

Output:

```
0
1
0
1
```

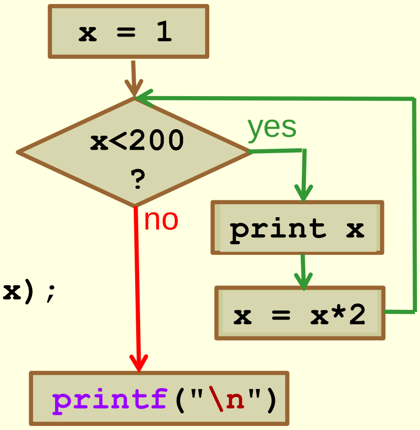
== ***Equal to*** Logical Operator

!= ***Not Equal*** Logical Operator

WHILE loop

```c
#include <stdio.h>
void main(void)
{
  int x=1;

  while (x<200)
  {
    printf("[%d]  ", x);
    x = x * 2;
  }
  printf("\n");
}
```



```
[1]  [2]  [4]  [8]  [16]  [32]  [64]  [128]
```

Quiz: FOR Loop

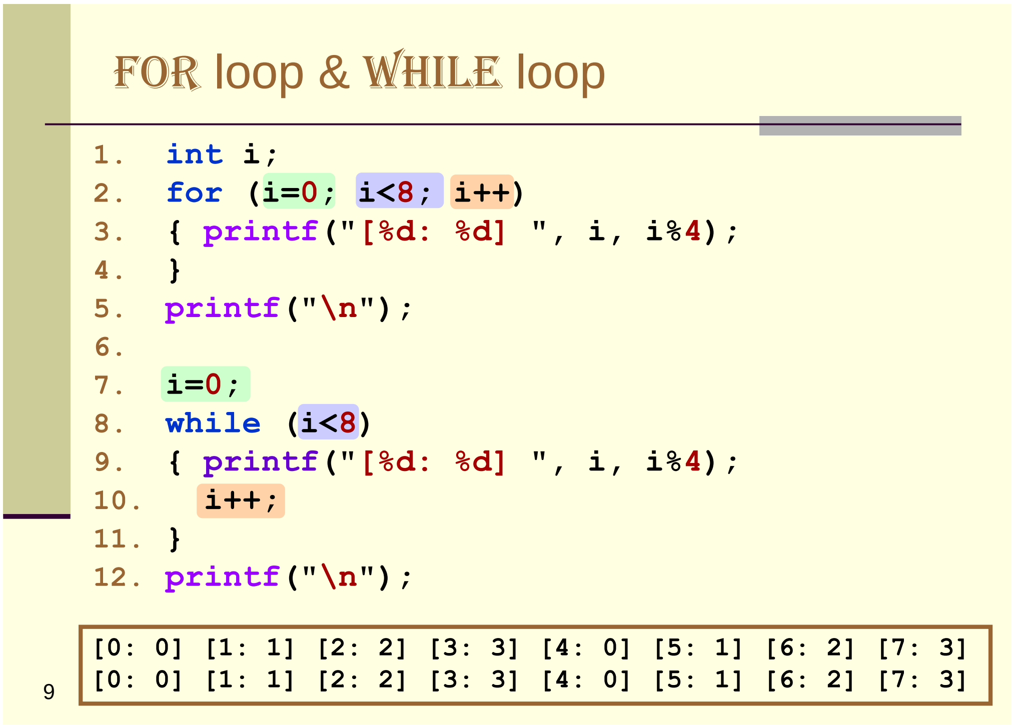
```c
#include <stdio.h>
void main(void)
{ float lower = 50;
  float upper = 75;
  float step  = 15;
  float f;

  for (f = lower; f <= upper; f = f + step)
  { printf("%4.1f\n", f);
  }
}
```

What is the ***last*** number printed by the given C program?

a) 45.0 b) 50.0 c) 60.0

d) 65.0 e) 75.0

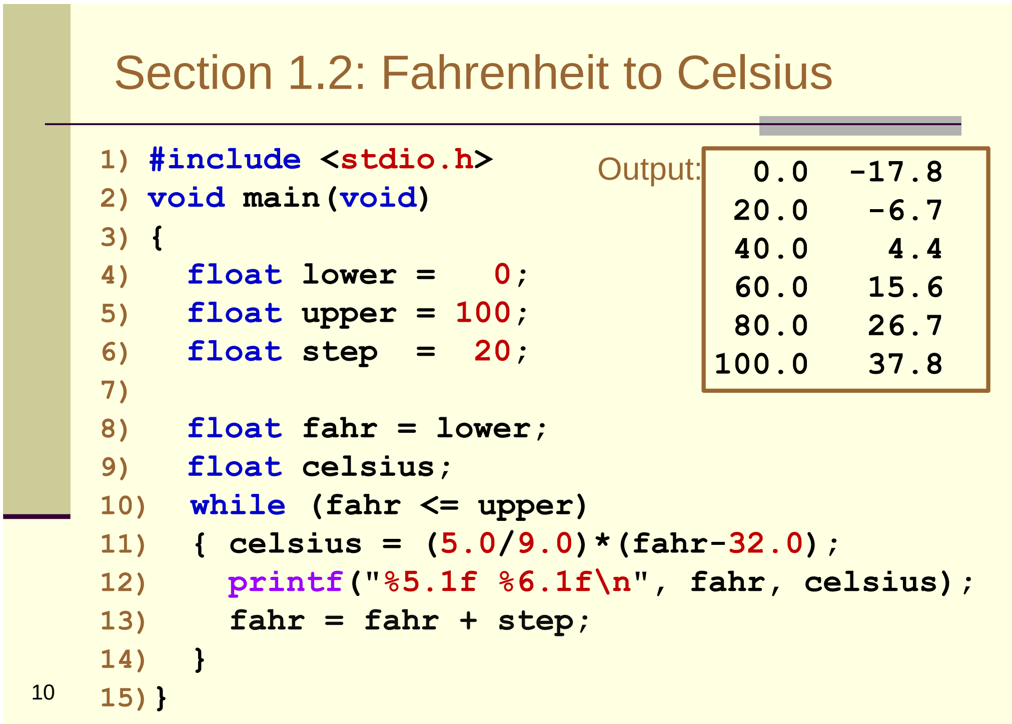


FOR loop & WHILE loop

```c
int i;
for (i=0; i<8; i++)
{ printf("[%d: %d] ", i, i%4);
}
printf("\n");

i=0;
while (i<8)
{ printf("[%d: %d] ", i, i%4);
  i++;
}
printf("\n");
```

```
[0: 0] [1: 1] [2: 2] [3: 3] [4: 0] [5: 1] [6: 2] [7: 3]
[0: 0] [1: 1] [2: 2] [3: 3] [4: 0] [5: 1] [6: 2] [7: 3]
```



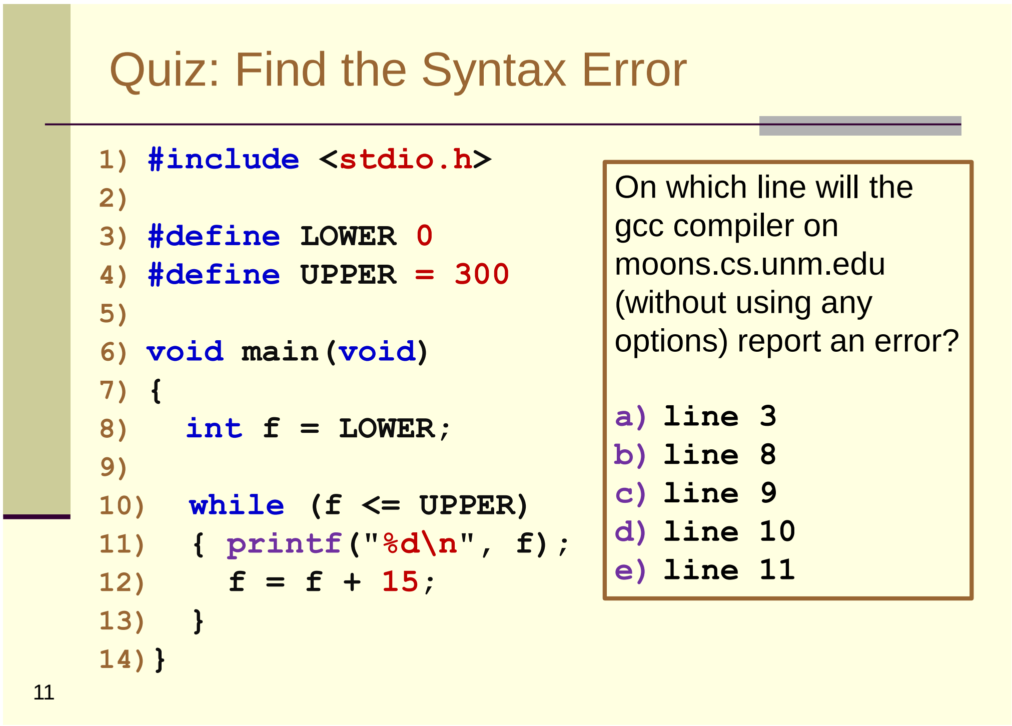
Section 1.2: Fahrenheit to Celsius

```c
#include <stdio.h>
void main(void)
{
  float lower =   0;
  float upper = 100;
  float step  =  20;

  float fahr = lower;
  float celsius;
  while (fahr <= upper)
  { celsius = (5.0/9.0)*(fahr-32.0);
    printf("%5.1f %6.1f\n", fahr, celsius);
    fahr = fahr + step;
  }
}
```

Output:

```
  0.0  -17.8
 20.0   -6.7
 40.0    4.4
 60.0   15.6
 80.0   26.7
100.0   37.8
```

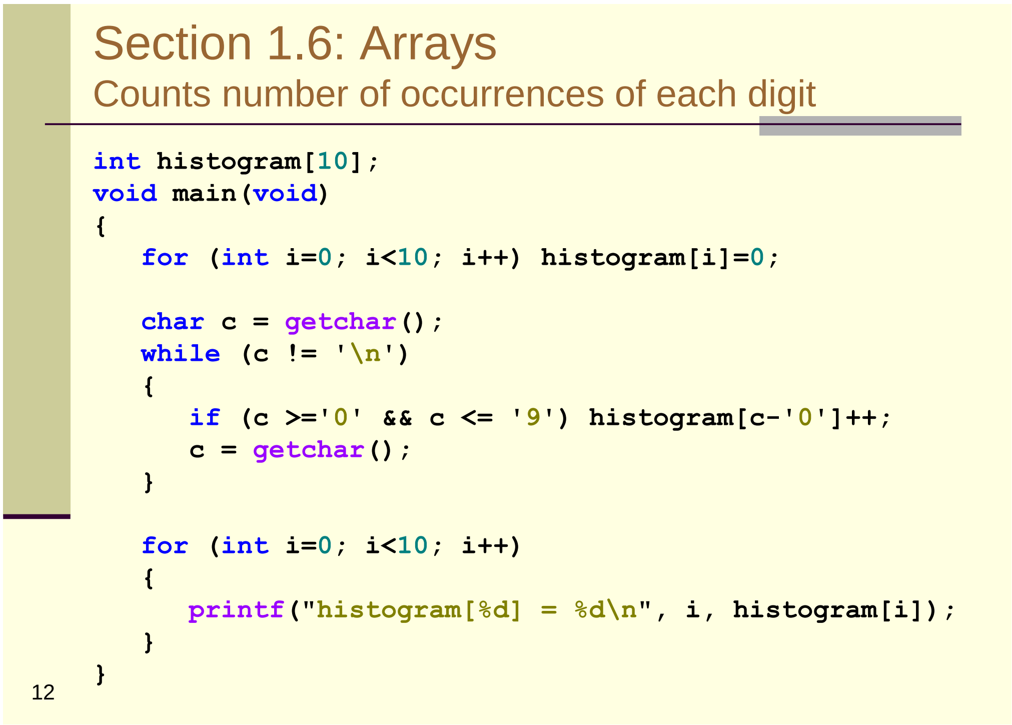


Quiz: Find the Syntax Error

```
1) #include <stdio.h>
2)
3) #define LOWER 0
4) #define UPPER = 300
5)
6) void main(void)
7) {
8)   int f = LOWER;
9)
10)   while (f <= UPPER)
11)   { printf("%d\n", f);
12)     f = f + 15;
13)   }
14) }
```

On which line will the gcc compiler on moons.cs.unm.edu (without using any options) report an error?

a) line 3
b) line 8
c) line 9
d) line 10
e) line 11



Section 1.6: Arrays

Counts number of occurrences of each digit

```
int histogram[10];
void main(void)
{
   for (int i=0; i<10; i++) histogram[i]=0;

   char c = getchar();
   while (c != '\n')
   {
      if (c >='0' && c <= '9') histogram[c-'0']++;
      c = getchar();
   }

   for (int i=0; i<10; i++)
   {
      printf("histogram[%d] = %d\n", i, histogram[i]);
   }
}
```