

Lecture 7.3: Overview

- Review
 - Lecture 4.1: Formatted output
 - Lecture 4.2: Structured programming, conditions
 - Lecture 5.1: Structured programming, loops
 - Lecture 5.2: Jump statements, debugging
 - Lecture 5.3: Functions, terms and concepts
 - Lecture 6.1: Functions, hierarchy, stack frames
 - Lecture 6.2: Functions, scope rules
 - Lecture 6.3: Standard library functions
 - Lecture 7.1: Data structures, arrays
 - Lecture 7.2: Passing arrays to functions, strings
- Review Quiz

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:

- Prime number test:
Iterate over $2 \leq i < x$
to find a divisor of x .
What should go into
the box in line 4?

- a) $i = 0;$
- b) $i = 1;$
- c) $i = 2;$
- d) $i = x;$
- e) $x = 0;$

```

int x, i;
printf("Please input a number: ");
scanf("%d", &x);
initialize variable i
while(i < x)
{ if(x % i == 0)
  { printf("%d is not prime\n", x);
    break;
  }
  i++;
}
if( none of the i is a divisor of x )
{ printf("%d is prime\n", x);
}

```

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:

- Prime number test:
Iterate over $2 \leq i < x$
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What should go into
the box in line 4?

- a) `i = 0;`
- b) `i = 1;`
-  c) `i = 2;`
- d) `i = x;`
- e) `x = 0;`

```
int x, i;
printf("Please input a number: ");
scanf("%d", &x);
initialize variable i
while(i < x)
{ if(x % i == 0)
  { printf("%d is not prime\n", x);
    break;
  }
  i++;
}
if( none of the i is a divisor of x )
{ printf("%d is prime\n", x);
}
```

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:

- Prime number test:
Iterate over $2 \leq i < x$
to find a divisor of x .
What should go into
the box in line 12?

- a) `x / i == 0`
- b) `x < i`
- c) `i / x == 0`
- d) `i + 1 == x`
- e) `i == x`

```
int x, i;
printf("Please input a number: ");
scanf("%d", &x);
initialize variable i
while(i < x)
{ if(x % i == 0)
  { printf("%d is not prime\n", x);
    break;
  }
  i++;
}
if( none of the i is a divisor of x )
{ printf("%d is prime\n", x);
}
```

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:

- Prime number test:
Iterate over $2 \leq i < x$
to find a divisor of x .
What should go into
the box in line 12?

- a) `x / i == 0`
- b) `x < i`
- c) `i / x == 0`
- d) `i + 1 == x`
-  e) `i == x`

```
int x, i;
printf("Please input a number: ");
scanf("%d", &x);
initialize variable i
while(i < x)
{ if(x % i == 0)
  { printf("%d is not prime\n", x);
    break;
  }
  i++;
}
if(  )
{ printf("%d is prime\n", x);
}
```

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:

- Which of the following program fragments will *not* terminate? (Check all that apply!)

a)

```
int a = 1;
while(a < 1000000)
{ a++; }
```

d)

```
int a = 10;
while(a > 0)
{ a = a / 3; }
```

b)

```
int a = 0;
while(a < 1000)
{ a = a * 3; }
```

e)

```
int a = 1;
while(a < 1000)
{ a = a << 1; }
```

c)

```
int a = 1;
while(a == 1)
{ a = a % 10; }
```

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Midterm 1 Review Quiz


- Top 5 “most difficult” questions:
- Which of the following program fragments will *not* terminate? (Check all that apply!)

a)

```
int a = 1;
while(a < 1000000)
{ a++; }
```

d)


```
int a = 10;
while(a > 0)
{ a = a / 3; }
```

 b)

```
int a = 0;
while(a < 1000)
{ a = a * 3; }
```

e)

```
int a = 1;
while(a < 1000)
{ a = a << 1; }
```

 c)

```
int a = 1;
while(a == 1)
{ a = a % 10; }
```

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:
- Which of the following C expressions yield the same result? (Check all that apply!)

a) $4 \ll 8 \% 5 / 2$

b) $(4 \ll 8) \% 5 / 2$

c) $4 \ll 8 \% (5 / 2)$

d) $(4 \ll 8 \% 5) / 2$

e) $4 \ll (8 \% 5) / 2$

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:
- Which of the following C expressions yield the same result?
(Check all that apply!)

- a) `4 << 8 % 5 / 2` (8)
- b) `(4 << 8) % 5 / 2` (2)
- c) `4 << 8 % (5 / 2)` (4)
- d) `(4 << 8 % 5) / 2` (16)
- e) `4 << (8 % 5) / 2` (8)

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:
- What is the output of the following C program fragment?

```
int i1 = 5, i2 = 2, i;
float f1 = 5, f2 = 2, f;
i = i1 / i2;
f = (int)(f1 / f2);
printf("i = %d, f = %f", i, f);
```

- a) `i = 2, f = 2`
- b) `i = 1, f = 2`
- c) `i = 2, f = 2.00000`
- d) `i = 2.00000, f = 2.50000`
- e) `i = 2, f = 2.50000`

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Midterm 1 Review Quiz

- Top 5 “most difficult” questions:
- What is the output of the following C program fragment?

```
int i1 = 5, i2 = 2, i;
float f1 = 5, f2 = 2, f;
i = i1 / i2;
f = (int)(f1 / f2);
printf("i = %d, f = %f", i, f);
```

- a) `i = 2, f = 2`
- b) `i = 1, f = 2`
-  c) `i = 2, f = 2.00000`
- d) `i = 2.00000, f = 2.50000`
- e) `i = 2, f = 2.50000`

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Quiz: Question 1

- Which of the following expressions would be treated as a true condition when used with an `if` statement?
(Check all that apply!)

- a) `(int)5.99 > 5`
- b) `1 || 0 && 1`
- c) `5 >= 5`
- d) `(1 + 2 + 3) == (3 << 2 >> 1)`
- e) `5 - 5`

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Quiz: Question 1

- Which of the following expressions would be treated as a true condition when used with an `if` statement?

(Check all that apply!)

- a) `(int)5.99 > 5`
- b) `1 || 0 && 1`
- c) `5 >= 5`
- d) `(1 + 2 + 3) == (3 << 2 >> 1)`
- e) `5 - 5`

Quiz: Question 2

- If `count` is an integer counter that counts upwards in steps of 1, how could one update the value of `count`?

(Check all that apply!)

- a) `count += 1;`
- b) `count = count + 1;`
- c) `++count;`
- d) `count++;`
- e) `count += count;`

Quiz: Question 2

- If `count` is an integer counter that counts upwards in steps of 1, how could one update the value of `count`?
(Check all that apply!)

- a) `count += 1;`
- b) `count = count + 1;`
- c) `++count;`
- d) `count++;`
- e) `count += count;`

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Quiz: Question 3

- What is the value of `x` after the following code fragment is executed?

```
int x = 0;
for(x = 1; x <= 10; x++)
{ }
```

- a) 0
- b) 1
- c) 9
- d) 10
- e) 11

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
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Quiz: Question 3

- What is the value of **x** after the following code fragment is executed?

```
int x = 0;
for(x = 1; x <= 10; x++)
{ }
```

- a) 0
- b) 1
- c) 9
- d) 10
-  e) 11

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Quiz: Question 4

- What is the value of **x** after the following code fragment is executed?

```
int x = 0;
do { x++;
} while(x < 9);
```

- a) 0
- b) 1
- c) 9
- d) 10
- e) 11

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
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Quiz: Question 4

- What is the value of **x** after the following code fragment is executed?

```
int x = 0;
do { x++;
    } while(x < 9);
```

- a) 0
- b) 1
-  c) 9
- d) 10
- e) 11

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Quiz: Question 5

- What is the value of **x** after the following code fragment is executed?

```
int x = 10;
while(x > 0)
{ x -= 2;
}
```

- a) -2
- b) -1
- c) 0
- d) 1
- e) 2

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
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Quiz: Question 5

- What is the value of x after the following code fragment is executed?

```
int x = 10;
while(x > 0)
{ x -= 2;
}
```

- a) -2
- b) -1
-  c) 0
- d) 1
- e) 2

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Quiz: Question 6

- Given the following function g , what is the result of $g(85)$?

```
char g(int n)
{
    switch(n/10)
    { case 10:
      case 9: return('A');
      case 8: return('B');
      case 7: return('C');
      case 6: return('D');
      default: return('F');
    }
}
```

- a) 'A'
- b) 'B'
- c) 'C'
- d) 'D'
- e) 'F'


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Quiz: Question 6

- Given the following function g , what is the result of $g(85)$?

- a) 'A'
-  b) 'B'
- c) 'C'
- d) 'D'
- e) 'F'

```
char g(int n)
{
    switch(n/10)
    { case 10:
      case 9: return('A');
      case 8: return('B');
      case 7: return('C');
      case 6: return('D');
      default: return('F');
    }
}
```

Quiz: Question 7

- What is output by the following C statement?


```
printf("x = %03d", 3 + 4);
```

- a) $x = 034$
- b) $x = 037$
- c) $x = 007$
- d) $x = 7$
- e) $x = 347$

Quiz: Question 7

- What is output by the following C statement?

```
printf("x = %03d", 3 + 4);
```


- a) x = 034
- b) x = 037
-  c) x = 007
- d) x = 7
- e) x = 347

Quiz: Question 8

- In the `gdb` debugger, what does `next` do?

- a) It moves to the next argument of the function.
- b) It calls the next function in the program.
- c) It executes the next statement in the program.
- d) It prints the value of the next variable.
- e) It loads the next program into the debugger.

Quiz: Question 8

- In the `gdb` debugger, what does `next` do?
 - a) It moves to the next argument of the function.
 - b) It calls the next function in the program.
 -  c) It executes the next statement in the program.
 - d) It prints the value of the next variable.
 - e) It loads the next program into the debugger.

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Quiz: Question 9

- Given the following code fragment, which of the following statements are true?
(Check all that apply!)

```
double f(int x);
void g(int x, int y)
{
    int z;

    z = f(x) + 2*y;
    return z;
}
```

- a) Function `f` is declared.
- b) Function `g` calls function `f`
- c) Variable `z` is a local variable of function `g`
- d) Function `g` is declared and defined.
- e) `y` is a parameter of function `g`.

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Quiz: Question 9

- Given the following code fragment, which of the following statements are true?
(Check all that apply!)

```
double f(int x);
void g(int x, int y)
{
    int z;

    z = f(x) + 2*y;
    return z;
}
```

- a) Function `f` is declared.
- b) Function `g` calls function `f`
- c) Variable `z` is a local variable of function `g`
- d) Function `g` is declared and defined.
- e) `y` is a parameter of function `g`.

Quiz: Question 10

- Given that the C standard math library is included, which of the following expressions results in the value `4.0`?
(Check all that apply!)

- a) `pow(16.0, .5)`
- b) `4.0 * cos(0.0)`
- c) `3 + sin(0.0)`
- d) `log10(10000.00)`
- e) `sqrt(15.0) + 1`

Quiz: Question 10

- Given that the C standard math library is included, which of the following expressions results in the value 4.0?
(Check all that apply!)

- a) `pow(16.0, .5)`
- b) `4.0 * cos(0.0)`
- c) `3 + sin(0.0)`
- d) `log10(10000.00)`
- e) `sqrt(15.0) + 1`

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Quiz: Question 11

- Given the following program fragment, what is the value of `g(2, f(3, 4))`?

- a) 8
- b) 9
- c) 10
- d) 11
- e) 12

```
int x = 7;

int f(int x, int y)
{
    return x + y;
}

int g(int x, int y)
{
    return f(y, x);
}
```


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Quiz: Question 11

- Given the following program fragment, what is the value of $g(2, f(3, 4))$?

- a) 8
-  b) 9
- c) 10
- d) 11
- e) 12

```
int x = 7;

int f(int x, int y)
{
    return x + y;
}

int g(int x, int y)
{
    return f(y, x);
}
```

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Quiz: Question 12

- What is output by the following program fragment?

- a) **EECS00 1**
- b) **EEC 10 0**
- c) **E E**
- d) **EECS C**
- e) **EEC C**

```
char s[] = "EECS10";

s[4] = 0;
printf("%s %c", s, s[2]);
```

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
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Quiz: Question 12

- What is output by the following program fragment?

```
char s[] = "EECS10";
s[4] = 0;
printf("%s %c", s, s[2]);
```

- a) EECS00 1
- b) EEC 10 0
- c) E E
-  d) EECS C
- e) EEC C

Quiz: Question 13

- Given the definition `double p=0.0125;` which of the following C statements will print out `p = 1.25%` ?
(Check all that apply!)

- a) `printf("p = %d.25%%", (int)(p*100.0));`
- b) `printf("p = %p", 100.0*p);`
- c) `printf("p = %.2f%%", p*100.0);`
- d) `printf("p = %.2f%c", p*100.0, '%');`
- e) `printf("p = ", 100.0 * p, "%");`

Quiz: Question 13

- Given the definition `double p=0.0125;` which of the following C statements will print out `p = 1.25%` ?
(Check all that apply!)

- a) `printf("p = %d.25%%", (int)(p*100.0));`
- b) `printf("p = %p", 100.0*p);`
- c) `printf("p = %.2f%%", p*100.0);`
- d) `printf("p = %.2f%c", p*100.0, '%');`
- e) `printf("p = ", 100.0 * p, "%");`

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Quiz: Question 14

- Which of the following statements is true for an *algorithm*?
(Check all that apply!)


- a) An algorithm must be indeterministic.
- b) An algorithm solves a problem quickly.
- c) An algorithm is historically based on Al Gore's rhythm.
- d) An algorithm executes a program using pseudo code.
- e) An algorithm must terminate after a finite number of steps.

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Quiz: Question 14

- Which of the following statements is true for an *algorithm*?
(Check all that apply!)
 - a) An algorithm must be indeterministic.
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 -  e) An algorithm must terminate after a finite number of steps.

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Quiz: Question 15

- Which of the following declarations can be added to the program in line 8 without creating a compilation error?
(Check all that apply!)

- a) `int f(int v, double w);`
- b) `int g = 0;`
- c) `int g(int x, int y);`
- d) `int x = 2;`
- e) `int f(double v, double w);`

```

1 int x = 2;
2 int f(int v, double w);
3 int g(int x, int y)
4 { int z;
5   z = 2*x + 5*y - 42;
6   return z;
7 }
8

```

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Quiz: Question 15

- Which of the following declarations can be added to the program in line 8 without creating a compilation error?

(Check all that apply!)

- a) `int f(int v, double w);`
- b) `int g = 0;`
- c) `int g(int x, int y);`
- d) `int x = 2;`
- e) `int f(double v, double w);`

```

1 int x = 2;
2 int f(int v, double w);
3 int g(int x, int y)
4 { int z;
5   z = 2*x + 5*y - 42;
6   return z;
7 }
8

```

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Quiz: Question 16

- The following function `issorted` is supposed to return true if and only if the given array `L` is sorted in increasing order.
- What should go into *Box1* in line 3?

- a) `i=1; i<10; i++`
- b) `i=0; i<10; i++`
- c) `i=0; i<9; i++`
- d) `i=10; i>0; i--`
- e) `i=9; i>=0; i--`

```

1 int issorted(int L[10])
2 { int i;
3   for(Box1)
4     { if(L[i] >= L[i+1])
5       { Box2; }
6     }
7   Box3 ;
8 }

```

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Quiz: Question 16

- The following function `issorted` is supposed to return true if and only if the given array `L` is sorted in increasing order.
- What should go into `Box1` in line 3?

a) `i=1; i<10; i++`
 b) `i=0; i<10; i++`
 c) `i=0; i<9; i++`
 d) `i=10; i>0; i--`
 e) `i=9; i>=0; i--`

```

1 int issorted(int L[10])
2 { int i;
3   for(Box1)
4     { if(L[i] >= L[i+1])
5       { Box2; }
6     }
7   Box3 ;
8 }
  
```

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Quiz: Question 17

- The following function `issorted` is supposed to return true if and only if the given array `L` is sorted in increasing order.
- What should go into `Box2` in line 5?

a) `return 0`
 b) `return 1`
 c) `continue`
 d) `break`
 e) `return`

```

1 int issorted(int L[10])
2 { int i;
3   for(Box1)
4     { if(L[i] >= L[i+1])
5       { Box2; }
6     }
7   Box3 ;
8 }
  
```


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Quiz: Question 17

- The following function `issorted` is supposed to return true if and only if the given array `L` is sorted in increasing order.
- What should go into `Box2` in line 5?

-  a) `return 0`
 b) `return 1`
 c) `continue`
 d) `break`
 e) `return`

```

1 int issorted(int L[10])
2 { int i;
3   for(Box1)
4     { if(L[i] >= L[i+1])
5       {Box2; }
6     }
7   Box3 ;
8 }
```

Quiz: Question 18

- The following function `issorted` is supposed to return true if and only if the given array `L` is sorted in increasing order.
- What should go into `Box3` in line 7?


- a) `return 0`
 b) `return 1`
 c) `continue`
 d) `break`
 e) `return`

```

1 int issorted(int L[10])
2 { int i;
3   for(Box1)
4     { if(L[i] >= L[i+1])
5       {Box2; }
6     }
7   Box3 ;
8 }
```

Quiz: Question 18

- The following function `issorted` is supposed to return true if and only if the given array `L` is sorted in increasing order.
- What should go into `Box3` in line 7?

- a) `return 0`
-  b) `return 1`
- c) `continue`
- d) `break`
- e) `return`

```

1 int issorted(int L[10])
2 { int i;
3   for(Box1)
4     { if(L[i] >= L[i+1])
5       {Box2; }
6     }
7   Box3 ;
8 }
```

Quiz: Question 19

- What is output by the following C statement?

```


int x = 0, y = 5;
x = y++;
printf("x = %d, y = %d", x, y);
```

- a) `x = 0, y = 5`
- b) `x = 5, y = 5`
- c) `x = 5, y = 6`
- d) `x = 6, y = 5`
- e) `x = 6, y = 6`

Quiz: Question 19

- What is output by the following C statement?

```
int x = 0, y = 5;  
x = y++;  
printf("x = %d, y = %d", x, y);
```

- a) x = 0, y = 5
- b) x = 5, y = 5
-  c) x = 5, y = 6
- d) x = 6, y = 5
- e) x = 6, y = 6

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Quiz: Question 20

- What is output by the following C statement?

```
int x = 0, y = 5;  
x = ++y;  
printf("x = %d, y = %d", x, y);
```

- a) x = 0, y = 5
- b) x = 5, y = 5
- c) x = 5, y = 6
- d) x = 6, y = 5
- e) x = 6, y = 6

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Quiz: Question 20

- What is output by the following C statement?


```
int x = 0, y = 5;  
x = ++y;  
printf("x = %d, y = %d", x, y);
```

a) `x = 0, y = 5`

b) `x = 5, y = 5`

c) `x = 5, y = 6`

d) `x = 6, y = 5`

 e) `x = 6, y = 6`