

# EECS 22: Advanced C Programming

## Lecture 13

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## Lecture 13: Overview

- Course Administration
  - Fairness quiz
  - Midterm course evaluation
- Midterm Course Review
  - Syntax and semantics of C programs
  - Types, expressions, statements, functions
  - Recursion, modules, Makefile, debugging
- Practice
  - Review Quiz

## EECS 22 Fairness Quiz


- Given the clearly announced hard deadline, which of the following are valid excuses for acceptance of a late submission? (Check all that apply!)
  - a) My watch showed I still had 2 minutes.
  - b) I used the wrong submission command.
  - c) I was still debugging the last problem in my code.
  - d) My network connection broke down.
  - e) I had a medical emergency and can provide documentation.

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## EECS 22 Fairness Quiz

- Given the clearly announced hard deadline, which of the following are valid excuses for acceptance of a late submission? (Check all that apply!)
  - a) My watch showed I still had 2 minutes.
  - b) I used the wrong submission command.
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## Course Administration

- Midterm Course Evaluation
  - This week!
  - Wednesday, Oct. 25, 8am – Nov. 1, 8am
  - Online via EEE Evaluation application
- Feedback from students to instructors
  - Completely voluntary
  - Completely anonymous
  - Very valuable
    - Help to improve this class!
- Mandatory Final Course Evaluation
  - expected for week 10 (TBA)

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## Midterm Course Review

- Introduction, course setup, Linux
- Tokens, basic types, operators, formatted I/O
- Control-flow statements, conditionals and loops
- Arrays and array indexing
- Functions, call graph, call trace, call stack
- Pass by value vs. pass by reference
- Recursion
- Scope, variable lifetime, storage classes
- Compiler components, translation units
- Make and Makefile, rules, targets and dependencies
- Assertions, debugging, GDB commands

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## Quiz: Question 11


- Today's computers run at which clock speed?
  - a) 85 MPH
  - b) 1 kHz
  - c) 1 ms
  - d) 1 GHz
  - e) 1 MHz

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## Quiz: Question 11

- Today's computers run at which clock speed?
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## Quiz: Question 12

- Which of the following names are valid keywords in ANSI C?  
(Check all that apply!)
  - a) `if`
  - b) `when`
  - c) `void`
  - d) `main`
  - e) `Int`

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## Quiz: Question 12

- Which of the following names are valid keywords in ANSI C?  
(Check all that apply!)
  - a) `if`
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  - c) `void`
  - d) `main`
  - e) `Int`

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## Quiz: Question 13

- Which of the following names are valid identifiers in ANSI C?  
(Check all that apply!)
  - a) `xyz`
  - b) `PC`
  - c) `dollar amount`
  - d) `My_Very_Long_Variable_Name`
  - e) `2fast4you`

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## Quiz: Question 13

- Which of the following names are valid identifiers in ANSI C?  
(Check all that apply!)
  - a) `xyz`
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  - c) `dollar amount`
  - d) `My_Very_Long_Variable_Name`
  - e) `2fast4you`

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## Quiz: Question 14

- Which of the following constructs are valid type names in ANSI C?  
(Check all that apply!)
  - a) `short char`
  - b) `long double`
  - c) `signed long long`
  - d) `unsigned float`
  - e) `signed`

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## Quiz: Question 14

- Which of the following constructs are valid type names in ANSI C?  
(Check all that apply!)
  - a) `short char`
  - b) `long double`
  - c) `signed long long`
  - d) `unsigned float`
  - e) `signed`

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## Quiz: Question 15

- Which of the following constants is of type `double`?  
(Check all that apply!)
  - a) `42`
  - b) `.42`
  - c) `4e2`
  - d) `4E2`
  - e) `42f`

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## Quiz: Question 15

- Which of the following constants is of type `double`?  
(Check all that apply!)
  - a) `42`
  - b) `.42`
  - c) `4e2`
  - d) `4E2`
  - e) `42f`

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## Quiz: Question 16

- What is the value of the integer **x** after the following statement?


```
x = 3 << 2 >> 1;
```

- a) **Syntax Error!**
- b) 3
- c) 6
- d) 12
- e) 321

## Quiz: Question 16

- What is the value of the integer **x** after the following statement?

```
x = 3 << 2 >> 1;
```

- a) **Syntax Error!**
- b) 3
-  c) **6**
- d) 12
- e) 321

## Quiz: Question 17

- Which of the following expressions correctly computes the polynomial  $p = 2x^2 - 3x + 4$  ?  
(Check all that apply!)
  - `p = 2x^2 - 3x + 4;`
  - `p = 2xx - 3x + 4;`
  - `p = x*x*2 - 3*x + 4.0;`
  - `p = 2*(x*x + 3)*x + 4;`
  - `p = (2*x - 3)*x + 4;`

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## Quiz: Question 18

- What is the result of the evaluation of the following expression?


```
1 == 2 || 3 < 4 && 5 > 6
```

- a) 123456
- b) true
- c) false
- d) 1
- e) 0

## Quiz: Question 18

- What is the result of the evaluation of the following expression?

```
1 == 2 || 3 < 4 && 5 > 6
```

- a) 123456
- b) true
- c) false
- d) 1
-  e) 0

## Quiz: Question 19

- Simple prime number test:  
The following code fragment iterates variable  $i$  over the range  $2 \leq i < x$  to find a divisor of  $x$ .

What should go into box 1 in line 4?

- $i = 0;$
- $i = 1;$
- $i = 2;$
- $i = x;$
- $x = 0;$

```
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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## Quiz: Question 19

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## Quiz: Question 20

- Simple prime number test:  
The following code fragment iterates variable  $i$  over the range  $2 \leq i < x$  to find a divisor of  $x$ .

What should go into box 2 in line 12?

- $x / i == 0$
- $x < i$
- $i / x == 0$
- $i + 1 == x$
- $i == x$

```
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;
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What should go into box 2 in line 12?

- $x / i == 0$
- $x < i$
- $i / x == 0$
- $i + 1 == x$
- $i == x$**

```
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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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## Quiz: Question 21

- Which of the following variable declarations are valid in ANSI-C?  
(Check all that apply!)
  - a) `double xyz;`
  - b) `double x, y, z;`
  - c) `double x = 1.0;`
  - d) `double x = 1.1, y = 2.2, z = 3.3;`
  - e) `double x,y,z = 1.0,2.0,3.0;`

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  - c) `double x = 1.0;`
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  - e) `double x,y,z = 1.0,2.0,3.0;`

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## Quiz: Question 22

- Which of the following data types has the largest range of representable numbers?
  - a) `char`
  - b) `short int`
  - c) `long long int`
  - d) `unsigned int`
  - e) `signed long int`


## Quiz: Question 22

- Which of the following data types has the largest range of representable numbers?
  - a) `char`
  - b) `short int`
  -  c) `long long int`
  - d) `unsigned int`
  - e) `signed long int`

## Quiz: Question 23

- Which of the following data types can store the greatest value?
  - a) `long int`
  - b) `long long int`
  - c) `unsigned long long int`
  - d) `float`
  - e) `double`

## Quiz: Question 23


- Which of the following data types can store the greatest value?
  - a) `long int`
  - b) `long long int`
  - c) `unsigned long long int`
  - d) `float`
  -  e) `double`



## Quiz: Question 24

- 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 24

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## Quiz: Question 25

- Assume that  $x$  is an integer in the range of 1 through 10 inclusively. Which of the following expressions can be used as a test for  $x$  being an even number? (Check all that apply!)
  - $x \% 2 == 0$
  - $x / 2 > 1$
  - $x \% 2 == 1$
  - $x / 2 * 2 == x$
  - $x==2 \ || \ x==4 \ || \ x==6 \ || \ x==8 \ || \ x==10$

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## Quiz: Question 25

- Assume that  $x$  is an integer in the range of 1 through 10 inclusively. Which of the following expressions can be used as a test for  $x$  being an even number? (Check all that apply!)
  - $x \% 2 == 0$
  - $x / 2 > 1$
  - $x \% 2 == 1$
  - $x / 2 * 2 == x$
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## Quiz: Question 26

- Given the following function `grade`, what is the result of `grade(85)`?

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

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

## Quiz: Question 26

- Given the following function `grade`, what is the result of `grade(85)`?

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

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

## Quiz: Question 27

- 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

## Quiz: Question 27

- 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

## Quiz: Question 28

- Given the following program fragment, what is printed when it gets executed?

- a) nothing
- b) 0
- c) 10
- d) 20
- e) 30

```
int i = 1;
int s = 0;
while (1)
{ i++;
  if (i >= 10)
  { break; }
  if (i % 2 == 1)
  { continue; }
  s += i;
}
printf("%d", s);
```

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## Quiz: Question 28

- Given the following program fragment, what is printed when it gets executed?

- a) nothing
- b) 0
- c) 10
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- e) 30

```
int i = 1;
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{ i++;
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  s += i;
}
printf("%d", s);
```

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## Quiz: Question 29

- Given the following code fragment, which of the following statements are true?

(Check all that apply!)

- 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`.

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

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

## Quiz: Question 29

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(Check all that apply!)

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

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

## Quiz: Question 30

- 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);
}
```

## Quiz: Question 30

- 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;

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