

EECS 10: Computational Methods in Electrical and Computer Engineering

Lecture 18

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Lecture 18: Overview

- Review
 - Recursion
 - Structures, unions, enumerators
 - Binary data representation, memory
 - Pointers, pointer operations
 - String operations using pointers
 - File processing
 - Translation units
- Midterm Review Quiz
 - Top 5 “most difficult” questions
- Review Quiz

Midterm 2 Review Quiz

- Top 5 most “difficult” questions:
 - In the program below, what is the result of calling `grade(75)`?


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

```

1 char grade(int x)
2 { char g;
3   if (x > 90)
4     { g = 'A'; }
5   if (x > 80)
6     { g = 'B'; }
7   if (x > 70)
8     { g = 'C'; }
9   if (x > 60)
10    { g = 'D'; }
11  else
12    { g = 'F'; }
13  return g;
14 }
```

Midterm 2 Review Quiz

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13  return g;
14 }
```

Midterm 2 Review Quiz

- Top 5 most “difficult” questions:
 - In the program below, what is the result of calling `grade(80-90)`?

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

```

1 char grade(int x)
2 { char g;
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4     { g = 'A'; }
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Midterm 2 Review Quiz

- Top 5 most “difficult” questions:
 - Which of the following are valid definitions of an integer array **A** of size 3?
(Check all that apply!)
- a) `int A[3];`
b) `int A[3] = {1,2,3};`
c) `int A[3] = {};`
d) `int A[3] = {1, 2};`
e) `int A[] = {1,2,3};`

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Midterm 2 Review Quiz

- Top 5 most “difficult” questions:
 - Given two global variables `int x=7` and `int y=8`, which of the following functions properly swaps the values such that `x=8` and `y=7`? (Check all that apply!)

a)

```
void swap(int x, int y)
{ x = y; y = x;
}
```

b)

```
void swap(void)
{ x = y; y = x;
}
```

c)

```
void swap(void)
{ int t;
  t = x; x = y; y = t;
}
```

d)

```
void swap(void)
{ int t;
  t = y; y = x; x = t;
}
```

e)

```
void swap(int x, int y)
{ int t;
  t = x; x = y; y = t;
}
```

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void swap(void)
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  t = y; y = x; x = t;
}
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e)

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void swap(int x, int y)
{ int t;
  t = x; x = y; y = t;
}
```

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Midterm 2 Review Quiz

- Top 5 most “difficult” questions:
 - In the `gdb` debugger, which commands allow you to run your program step by step? (Check all that apply!)
- a) `step`
 - b) `cont`
 - c) `run`
 - d) `next`
 - e) `back`

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 - d) `next`
 - e) `back`

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Quiz: Question 1


- In the program below, what is printed by the function call `g(1)`?

- a) 1 2
- b) 2 3
- c) 1 1
- d) 2
- e) 1

```
1 int f(int x)
2 { printf("%d ", x);
3   return x + 1;
4 }
5 int g(int x)
6 { printf("%d ", f(x));
7   return x + 2;
8 }
```

Quiz: Question 1

- In the program below, what is printed by the function call `g(1)`?

-  a) 1 2
- b) 2 3
- c) 1 1
- d) 2
- e) 1

```
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2 { printf("%d ", x);
3   return x + 1;
4 }
5 int g(int x)
6 { printf("%d ", f(x));
7   return x + 2;
8 }
```

Quiz: Question 2

- What is recursion?
(Check all that apply!)
 - a) A function that does not terminate.
 - b) A function that calls itself.
 - c) A function that contains a loop.
 - d) A function f that calls a function g which calls f .
 - e) A function that returns no value.

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Quiz: Question 3

- Given the function definition below, what is printed for the function call $f(3)$?

- a) 1 2 3
- b) 1 2 3 4
- c) 3 2 1 0
- d) 4 3 2 1
- e) 3 2 1

```
1 void f(int x)
2 {
3     printf("%d ", x);
4     if (x > 0)
5         { f(x-1); }
6 }
```


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Quiz: Question 3

- Given the function definition below, what is printed for the function call $f(3)$?

- a) 1 2 3
- b) 1 2 3 4
-  c) 3 2 1 0
- d) 4 3 2 1
- e) 3 2 1

```
1 void f(int x)
2 {
3     printf("%d ", x);
4     if (x > 0)
5         { f(x-1); }
6 }
```

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Quiz: Question 4

- Given the following definition of the vectors $\mathbf{v1}$, $\mathbf{v2}$ and $\mathbf{v3}$, what is a correct way to perform a vector addition of $\mathbf{v1}$ and $\mathbf{v2}$?


```
struct v {int x, y;} v1, v2, v3;
```

- a) $\mathbf{v3} = \mathbf{v1} + \mathbf{v2};$
- b) $\mathbf{v3} = \mathbf{v1}[\mathbf{x}]*\mathbf{v2}[\mathbf{y}] + \mathbf{v1}[\mathbf{y}]*\mathbf{v2}[\mathbf{x}]$
- c) $\mathbf{v3}[0] = \mathbf{v1}[0] + \mathbf{v2}[0];$
 $\mathbf{v3}[1] = \mathbf{v1}[1] + \mathbf{v2}[1];$
- d) $\mathbf{v3.x} = \mathbf{v1.x} + \mathbf{v2.x};$
 $\mathbf{v3.y} = \mathbf{v1.y} + \mathbf{v2.y};$
- e) $\mathbf{v3->x} = \mathbf{v1->x} + \mathbf{v2->x};$
 $\mathbf{v3->y} = \mathbf{v1->y} + \mathbf{v2->y};$

Quiz: Question 4

- Given the following definition of the vectors $\mathbf{v1}$, $\mathbf{v2}$ and $\mathbf{v3}$, what is a correct way to perform a vector addition of $\mathbf{v1}$ and $\mathbf{v2}$?

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- b) $\mathbf{v3} = \mathbf{v1}[\mathbf{x}]*\mathbf{v2}[\mathbf{y}] + \mathbf{v1}[\mathbf{y}]*\mathbf{v2}[\mathbf{x}]$
- c) $\mathbf{v3}[0] = \mathbf{v1}[0] + \mathbf{v2}[0];$
 $\mathbf{v3}[1] = \mathbf{v1}[1] + \mathbf{v2}[1];$
-  d) $\mathbf{v3.x} = \mathbf{v1.x} + \mathbf{v2.x};$
 $\mathbf{v3.y} = \mathbf{v1.y} + \mathbf{v2.y};$
- e) $\mathbf{v3->x} = \mathbf{v1->x} + \mathbf{v2->x};$
 $\mathbf{v3->y} = \mathbf{v1->y} + \mathbf{v2->y};$

Quiz: Question 5

- Given the following enumerator definition, what is printed by `printf("%d", two);`?


```
enum count {one, two, three, four = 4};
```

- a) one
- b) two
- c) three
- d) 1
- e) 2

Quiz: Question 5

- Given the following enumerator definition, what is printed by `printf("%d", two);`?

```
enum count {one, two, three, four = 4};
```

- a) one
- b) two
- c) three
-  d) 1
- e) 2

Quiz: Question 6

- Which of the following components do you find in every computer?
(Check all that apply!)
- a) **ROM**
 - b) **RUM**
 - c) **BUG**
 - d) **CPU**
 - e) **IBM**

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Quiz: Question 6

- Which of the following components do you find in every computer?
(Check all that apply!)
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 - b) **RUM**
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 - d) **CPU**
 - e) **IBM**

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Quiz: Question 7


- What is the decimal value of the (unsigned) binary number 01010101_2 ?
 - a) 01010101
 - b) 85
 - c) 101
 - d) 170
 - e) 255

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Quiz: Question 7

- What is the decimal value of the (unsigned) binary number 01010101_2 ?
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Quiz: Question 8


- What is the binary value of the hexadecimal number FF_{16} ?
 - a) 01010101
 - b) 10001000
 - c) 01110111
 - d) 00010001
 - e) 11111111

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Quiz: Question 8

- What is the binary value of the hexadecimal number FF_{16} ?
 - a) 01010101
 - b) 10001000
 - c) 01110111
 - d) 00010001
 -  e) 11111111

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Quiz: Question 9


- How many bits do you need to represent one hexadecimal digit?
- a) 1
b) 2
c) 4
d) 8
e) 16

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Quiz: Question 9

- How many bits do you need to represent one hexadecimal digit?
- a) 1
b) 2
 c) 4
d) 8
e) 16

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Quiz: Question 10

- What could cause a **bus error**?
(Check all that apply!)
 - a) Waking up late and missing the bus.
 - b) Calling a recursive function.
 - c) Accessing an array with an index out of range.
 - d) Referencing a pointer variable with invalid value.
 - e) Accessing an integer variable with invalid value.

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Quiz: Question 11

- In C, which properties does every object have?
(Check all that apply!)
 - a) A size.
 - b) A value.
 - c) A weight.
 - d) A type.
 - e) A location.

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Quiz: Question 11

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 - d) A type.
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Quiz: Question 12

- Given the program segment below, what is the value of `*p` at the end?

- a) 1
- b) 2
- c) 3
- d) 4
- e) 5

```
1 int x[] = {1,2,3,4,5};  
2 int *p = &x[2];  
3  
4 p++;  
5 p -= 2;
```

Quiz: Question 12

- Given the program segment below, what is the value of `*p` at the end?

- a) 1
-  b) 2
- c) 3
- d) 4
- e) 5

```
1 int x[] = {1,2,3,4,5};  
2 int *p = &x[2];  
3  
4 p++;  
5 p -= 2;
```

Quiz: Question 13

- Given the function and variable definitions shown below, which function call is valid? (Check all that apply!)

- a) `StrLen(cp);`
- b) `StrLen(ca);`
- c) `StrLen(c);`
- d) `StrLen(i);`
- e) `StrLen("abc");`

```

1 int StrLen(
2     const char *s)
3 { int l = 0;
4   while(*s)
5     { s++;
6       l++;
7     }
8   return l;
9 }
10 char *cp = "hello";
11 char ca[] = "world";
12 char c = 'c';
13 int i = 42;

```

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Quiz: Question 13

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12 char c = 'c';
13 int i = 42;

```

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Quiz: Question 14

- Which of the following are functions declared in `stdio.h`?
(Check all that apply!)
- a) `printf`
 - b) `printfd`
 - c) `fprintf`
 - d) `sprint`
 - e) `fputs`

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Quiz: Question 14

- Which of the following are functions declared in `stdio.h`?
(Check all that apply!)

- a) `printf`
- b) `printfd`
- c) `fprintf`
- d) `sprint`
- e) `fputs`

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Quiz: Question 15

- What does the following code segment print?

```

1 char s[] = "Hppe!Mvdl!boe!Ibqqz!Ipmjebzt";
2 char *p;
3 p = &s[0];
4 while(*p)
5 { printf("%c", *p - 1);
6   p++;
7 }

```

- a) Hppe!Mvdl!boe!Ibqqz!Ipmjebzt
- b) Happy Holidays and Good Luck
- c) Happy Luck and Good Holidays
- d) Good Holidays and Happy Luck
- e) Good Luck and Happy Holidays

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Quiz: Question 15

- What does the following code segment print?

```

1 char s[] = "Hppe!Mvdl!boe!Ibqqz!Ipmjebzt";
2 char *p;
3 p = &s[0];
4 while(*p)
5 { printf("%c", *p - 1);
6   p++;
7 }

```

- a) Hppe!Mvdl!boe!Ibqqz!Ipmjebzt
- b) Happy Holidays and Good Luck
- c) Happy Luck and Good Holidays
- d) Good Holidays and Happy Luck
-  e) Good Luck and Happy Holidays

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