ECE 177 – Programming I: From C Foundations to Hardware Interaction Lecture 22

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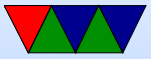
Announcements

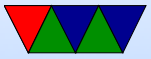
- Don't forget HW#5
- Adding additional HW questions about bit-manipulation/masking difficult.
- Don't wait until the last minute, a few of them are sort of tricky
- I've been trying to keep up with e-mail questions
- HW#6 will ideally be posted
  - I always complete the assignment myself before officially posting it which sometimes delays things



- You can start on what's there but I still might re-arrange some stuff later today, trying to make sure we get good coverage of topics before next midterm

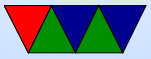
- Next midterm is set for April 10th which is only 2 weeks away

  More on that as it gets closer



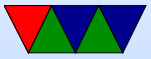
Midterm #1 Review

- Average was 69%

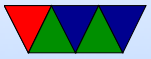


Midterm #1 Review

- Some notes on grading and final grades
- Some notes on academic honesty
- Some notes on AI usage
- Some notes on the lack of Quizzes
- Some notes on ink color
- Some notes on why this is done on paper, it's really the only practical way to make sure you aren't using AI (why not AI?)
  Believe it or not, when I ask you to write Hello World it's

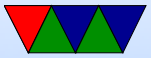


not because I have a personal need for 80 Hello World programs, but rather I'm hoping it's a step on the way to you learning how to code. If you use AI to do the easy stuff then you won't be able to learn the hard stuff

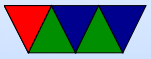


Midterm Q1 – Numbering systems

- Convert 0x15 from hex to 8-bit binary?
  Note it's hexadecimal with 0x15 in front, not decimal
  It's straightforward to convert a nibble (4 bits) at a time
- Convert -1 to signed twos-complement binary. I meant to say 8-bit, not sure why so many people went for 4 bits
- Number from ASCII table
- Other questions I could have asked
  - Binary back to hex, how do that?

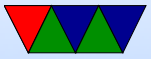


- Binary to decimal and vice versa?
- Octal



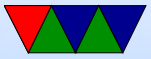
Midterm Q2 – Variable Declarations

- A variable named a with value -5
  Needs to be signed. In this case any size int. Will not take a double, though in theory you could. In that case it would be -5.
- A variable named ch with value Q. Remember, single quotes if it's just a char
- Floating point value, use float or double, wasn't particular.
- This last one confused you, 0xcafec0de is a 32-bit



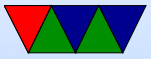
hexadecimal number. So need something at least 32-bits. And it's just a constant. Some people confused it's called password and thought it was a string

- Could you use the `stdint.h` includes, `int32_t`?
- Note, `int signed (x);` apparently is valid, had to look it up



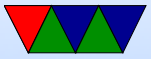
Midterm Q3 – Loops

- Loop always guaranteed to run at least once is a do/while loop
- I wasn't mean about it this time, but if it says it shouldn't be more than 4 lines long, then don't include lots of extra stuff that makes it more than 4 lines long
- common issues with this one
  - Forgetting to print the number at the beginning of the line with `"%d"`. I felt both the example and the instructions were pretty clear you needed to print the



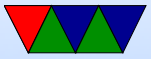
number, colon, and the string. I will clarify for next time

- Forgetting to declare the iterator
- Getting the limits on the for loop wrong, it's easy in C to be off by one



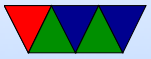
Midterm Q4 – Control Flow

- If statement with comparison and else
- Comparison with an `||` operator
- Case/switch statement



Midterm Q5 – Arrays

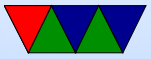
- Declare an array
- Set the "first" element (this is tricky with C nomenclature. I personally don't like calling `a[0]` the first because it gets tricky, especially as later if you say something like element 10 vs 10th element can be different things
- Also with this one, when I said "the array a above" I meant in the question immediately above. Some people thought I mean above as in greater than and tried to do



greater than operation

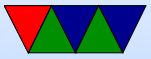
- If you define `int a[10]` is it correct to set `a[10]=10;`. No this is one past the end.

  Is it allowed to do this? Yes, generally C won't stop you and probably won't warn you. However you might be over-writing something important and your program might break or crash.

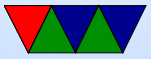


Midterm Q6 – Strings

- This one was heavily missed
- Declare a string named `st` that is initialized to ECE177
  - `char st[]="ECE177";`
  - `char *st="ECE177";`
  - `char st[7]="ECE177";` need one extra for NUL terminator
  - `char st[7]={'E','C','E'...'7','7',0};`
- The second part, string compare, was a bit of a trick question and I probably shouldn't have done it. It was none of the above, you should use strcmp() but the

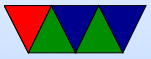


result is the inverse so you need a !



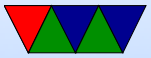
Midterm Q7 – Functions

- `i` can be declared in both, it's a local variable and variable scope allows it
- This is similar to code from the Lab, it makes a right triangle



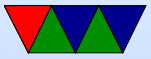
Midterm Q8 – Bitwise Logic

- People had trouble with this too. I was hoping the lab would have had you used to it (but Monday lab maybe hadn't met yet)
- I know we don't have a lot of homeworks on this. Problem is our department's way of teaching C is very hardware focused, if you took a CS course teaching you C they probably wouldn't dwell on bit manipulation as much
- Setting a bit without changing any other bits

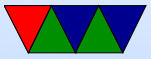


- `x|=(1<<13);`
- `x=x|(1<<13);`
- This is 8192 or 0x2000
- If you did binary be careful, I did count out, and for example 13th bit, they start counting at 0 so it might be one off from what you expect

- Clearing a bit without changing any other bits (masking)
  - `y&=~(1<<26);`
  - `y=y&(~(1<<26));`
  - Be careful if binary, you need all 1s below *and* above the masked off area



- Multiplying by 4 without using + or *
  - <<2
  - Be sure to get the direction right otherwise you are dividing



Midterm Q9 – Bonus

- Who invented C? Dennis Ritchie. Was surprised so many remembered. Wasn't Kerningham or Thompson though those are good guesses.
- What does `x+=x<<2` do? Multiply by 5. Wanted the concept, not a literal description of what it was doing.