New Jersey's Science &
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CS 280
Programming Language Concepts

Programming Notes
cctype

cctype

- standard header file in C++ distribution
- useful utilities for character classification

Testing letters

- Does a particular variable contain a letter?

```
char ch;
if( ch == 'a' || ch == 'b' || ch == 'c' || …
   // that works... but it's hard to type,
   // annoying to read, and error prone

if( ch >= 'a' && ch <= 'z' )
   // that's better… as long as letters are
   // contiguous from a-z (true for ascii)
```

cctype: character classification

```
char ch;

if( islower(ch) ) // much better!
```

- `islower(ch)  // true if lowercase`
- `isupper(ch)  // true if uppercase`
- `isdigit(ch)  // true if a digit`
- `isalpha(ch)  // true if a letter`
- `isalnum(ch)  // true if letter or num`

Converting case

- Converting from lower case to upper case

```
'A' + ch - 'a'
   // correct! but quite cryptic!

toupper(ch)
   // much easier to read
   // checks to make sure ch islower() first

There is also a tolower()
```

How could we implement cctype?

- logical test in function or macro
  - implement the logic test every time you need to test or convert a character
  - calling a function every time incurs a cost
  - can avoid this with inline functions or preprocessor macros
- a table lookup
  - at a cost of some space, a VERY fast implementation as an array lookup

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