

# CSE 333 – SECTION 4

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References, const and classes

# HW2

- Online now.
- Due on Thursday, May 7<sup>th</sup> by 11pm.
- Take a look at it soon. Start early.
- File crawler, indexer and a command-line search engine.

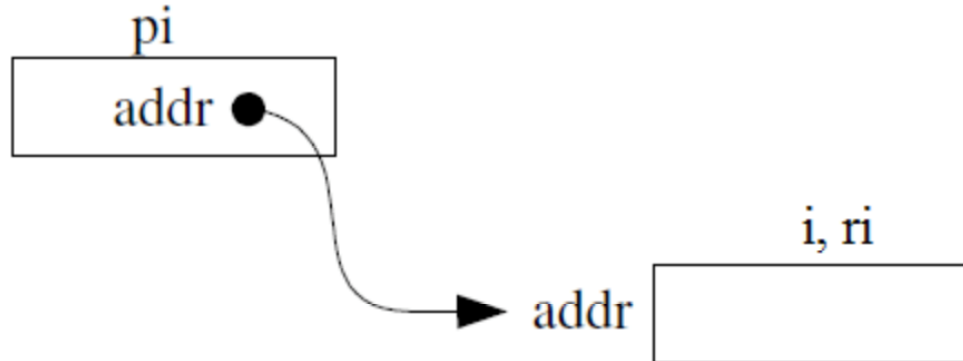
# This or that?

- Consider the following code:

## Pointers:

```
int i;  
int *pi = &i;
```

In both cases,



The difference lies in how they are used in expressions:

```
*pi = 4;
```

```
ri = 4;
```

# Pointers and References

- Once a reference is created, it cannot be later made to reference another object.
  - Compare to pointers, which are often reassigned.
- References cannot be *null*, whereas pointers can.
- References can never be uninitialized. It is also impossible to reinitialize a reference.

# C++ const declaration

- As a declaration specifier, `const` is a type specifier that makes objects unmodifiable.

```
const int m = 255;
```

- Reference to constant integer:

```
int n = 100;
```

```
const int &ri = n; // ri becomes read only
```

# When to use?

- Function parameter types and return types and functions that declare overloaded operators.
- **Pointers:** may point to many different objects during its lifetime. Pointer arithmetic (++ or --) enables moving from one address to another. (Arrays, for e.g.)
- **References:** can refer to only one object during its lifetime.
- **Style Guide Tip:**
  - use const reference parameters to pass input
  - use pointers to pass output parameters
  - input parameters first, then output parameters last

# C++ Classes

```
/* Note: This code is unfinished! Beware! */
class Point {
public:
    Point(const int x, const int y); // constructor
    int get_x() { return x_; } // inline member function
    int get_y() { return y_; } // inline member function
    double distance(const Point &p); // member function
    void setLocation(const int x, const int y); //member function
private:
    int x_; // data member
    int y_; // data member
}; // class Point
```

# Section Exercise

- Define a class `Rectangle` whose instance variables are a pair of `Point` objects (upper left, lower right).
- Include at least one constructor. Make sure you get `const` right in the right places.
- Methods:
  - **`getul()`**, **`getlr()`** - returns upper and lower points.
  - **`cornerPoints()`** – to obtain the corner points.
  - **`area()`** - returns the `Rectangle`'s area.
  - **`contains(Point &p)`** - returns true or false depending on whether point `p` is inside the rectangle.
- The `C++ Primer` text and [cplusplus.com](http://cplusplus.com) contain good reference material.