POINTERS IN C, PASSING POINTERS TO FUNCTIONS

CSSE 120—Rose Hulman Institute of Technology

Can functions modify actual parameters?

- In Python, no! (pass by value)
- Consider this function:

```
void downAndUp(int takeMeHigher, int putMeDown){
    takeMeHigher += 1;
    putMeDown -= 1;
 }
```

- How is this C function invoked?
  - downAndUp(up, down);
- Will calling the function change the values of the actual parameters **up** and **down**?

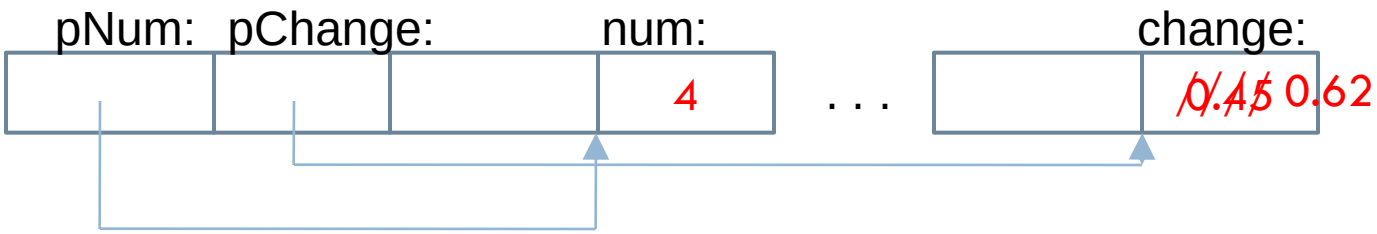
References to simple variables

- Pointers need to be used to change the value of an argument
- *A **pointer** is a variable that holds the **address** of a variable*

```
int num = 4;
int *pNum;
pNum = &num;
*pNum == num == 4
```

& is the address operator

```
double change = 0.45;
double *pChange;
pChange = &change;
*pChange = .62;
```



Pass pointers to values to be changed

- How do we modify downAndUp() so that it actually changes the values of its parameters?
  - By passing pointers to the parameters to be changed
- Together, implement a function that passes pointers to values to be changed
  - Checkout project PointersInclass from SVN
  - Implement **`downAndUpthatWorks()`**
  - Use function **`testdownAndUpthatWorks()`** to test **`downAndUpthatWorks()`**

Pointer Assignments

```
1.     int x=3, y = 5;
2.     int *px = &x;
3.     int *py = &y;
4.     printf("%d %d\n", x, y);
5.     *px = 10;
6.     printf("%d %d\n", x, y);  /* x is changed  */
7.     px = py;
8.     printf("%d %d\n", x, y);  /* x not changed */
9.       *px = 12;
10.    printf("%d %d\n", x, y);  /* y is changed  */
```

Break

- Starring **Binky**!
- (See http://cslibrary.stanford.edu/104/)

Pointer Pitfalls

- Don't try to dereference an unassigned pointer:
  - ```
    int *p;
    *p = 5;      /* oops! Program probably dies! */
    ```
- Pointer variables must be assigned *address* values.
  - ```
    int x = 3;
    int *p;
    p = x /* oops,  RHS should be &x */
    ```
- Be careful how you increment
  - ```
    *p +=1;      /* is not the same as … */
    ```
  - ```
    *p++;
    ```

In-class exercise on pointer pitfalls

- The rest of today's quiz lets you see some pointer pitfalls in action. These make great exam questions!
- Do it now

- When you are done, start the homework:
  - More pointer output
  - Writing functions to change variables
    - doubleMe
    - swap
  - scanf revisited