Princeton University  
COS 217: Introduction to Programming Systems  
Pointer-Related Operators

**Key**

- **p, p1, p2**  
  Pointer variables
- **i**  
  An integral expression

**Operators Meaningful for Any Pointer Variable**

**Dereference Operator**

\[*p\]  
The contents of the memory referenced by \(p\).

**Equality and Inequality Relational Operators**

\[p1 == p2\]  
1 if \(p1\) is equal to \(p2\), and 0 otherwise.

\[p1 != p2\]  
1 if \(p1\) is unequal to \(p2\), and 0 otherwise.

**Assignment Operator**

\[p1 = p2\]  
Side effect: Assign \(p2\) to \(p1\). The new value of \(p1\).

**Operators Meaningful for Pointers that Reference Array Elements**

**Arithmetic Operators**

\[p + i\]  
The address of the \(i\)th element after the one referenced by \(p\).

\[i + p\]  
The address of the \(i\)th element after the one referenced by \(p\).

\[p - i\]  
The address of the \(i\)th element before the one referenced by \(p\).

\[p++\]  
Side effect: Increment \(p\) to point to the next element.  
The previous value of \(p\).

\[++p\]  
Side effect: Increment \(p\) to point to the next element.  
The new value of \(p\).

\[p--\]  
Side effect: Decrement \(p\) to point to the previous element.  
The previous value of \(p\).

\[--p\]  
Side effect: Decrement \(p\) to point to the previous element.  
The new value of \(p\).

**Arithmetic Operators**

\[p1 - p2\]  
The "span" of \(p1\) and \(p2\).

**Relational Operators**

\[p1 < p2\]  
1 if \(p1\) is less than \(p2\), and 0 otherwise.

\[p1 <= p2\]  
1 if \(p1\) is less than or equal to \(p2\), and 0 otherwise.

\[p1 > p2\]  
1 if \(p1\) is greater than \(p2\), and 0 otherwise.

\[p1 >= p2\]  
1 if \(p1\) is greater than or equal to \(p2\), and 0 otherwise.
Assignment Operators

\[ p += i \quad \text{Side effect: Increment } p \text{ so its value is the address of the } i\text{th element after the one referenced by } p. \]
\[ \text{The new value of } p. \]

\[ p -= i \quad \text{Side effect: Decrement } p \text{ so its value is the address of the } i\text{th element before the one referenced by } p. \]
\[ \text{The new value of } p. \]

Disallowed

\[ p1 + p2 \]
\[ i - p \]
\[ i += p \]
\[ i -= p \]
\[ p == i \]

Array Subscripting Operator

\[ p[i] \quad *(p + i), \text{ that is, the contents of memory at the address that is } i \text{ elements after the address referenced by } p. \]