

Princeton University

COS 217: Introduction to Programming Systems

The "const" Keyword with Pointers

Pointer to Constant

```
1: const int i1 = 100;
2: const int i2 = 200;
3: const int *pi = &i1;          /* pi is a "pointer to a constant." */
4: i1 = 300;                    /* Error. Cannot change i1. */
5: i2 = 400;                    /* Error. Cannot change i2. */
6: pi = &i2;                    /* OK. */
7: *pi = 500;                   /* Error. Cannot change *pi. */
```

Constant Pointer

```
1: int i1 = 100;
2: int i2 = 200;
3: int *const pi = &i1;         /* pi is a "constant pointer." */
4: i1 = 300;                   /* OK. */
5: i2 = 400;                   /* OK. */
6: pi = &i2;                   /* Error. Cannot change pi. */
7: *pi = 500;                  /* OK. */
```

Constant Pointer to Constant

```
1: const int i1 = 100;
2: const int i2 = 200;
3: const int *const pi = &i1;   /* pi is a "constant pointer to a constant." */
4: i1 = 300;                   /* Error. Cannot change i1. */
5: i2 = 400;                   /* Error. Cannot change i2. */
6: pi = &i2;                   /* Error. Cannot change pi. */
7: *pi = 500;                  /* Error. Cannot change *pi. */
```

Disallowed Mismatch

```
1: const int i1 = 100;
2: const int i2 = 200;
3: int *pi = &i1;          /* Error. Subversive.
                           Subsequently changing *pi would change i1. */
```

Disallowed Mismatch in Function Calls

```
1: void f(int *pi)
2: {
3:     ...
4: }
...
5: const int i1 = 5;
6: const int *pi2 = &i1;
7: f(pi2);                /* Error. Subversive.
                           If f() changes *pi, then *pi2 also would change. */
```

Allowed Mismatch

```
1: int i1 = 100;
2: int i2 = 200;
3: const int *pi = &i1;   /* OK, even though subsequently changing i1 would change *pi.
*/
4: i1 = 300;              /* OK. Also changes *pi. */
5: i2 = 400;              /* OK. */
6: pi = &i2;              /* OK, even though subsequently changing i2 would change *pi.
*/
7: *pi = 500;            /* Error. Cannot change *pi. */
```

Allowed Mismatch in Function Calls

```
1: void f(const int *pi)
2: {
3:     ...
4: }
...
5: int i1 = 5;
6: int *pi2 = &i1;
7: f(pi2);                /* OK. *pi2 is protected against accidental change by f(). */
```