Princeton University
COS 217: Introduction to Programming Systems
C Dynamic Memory Management Fundamentals

Dynamic Memory Allocation for Elementary Types

```
int *pi;
...
pi = (int*)malloc(sizeof(*pi));
/* pi = (int*)malloc(sizeof(int)); */
/* pi = (int*)malloc(4); */
...
*pi = 5;
...
free(pi);
...
```

Dynamic Memory Allocation for Arrays

```
int *pi;
...
pi = (int*)calloc(5, sizeof(*pi));
/* pi = (int*)calloc(5, sizeof(int)); */
/* pi = (int*)calloc(5, 4); */
/* pi = (int*)malloc(5 * sizeof(*pi)); */
/* pi = (int*)malloc(5 * sizeof(int)); */
/* pi = (int*)malloc(20); */
...
*(pi + 2) = 5;
pi[3] = 6;
...
free(pi);
...
```

Dynamic Memory Allocation for Structures

```
struct Location {int iLat; int iLon;};
...
struct Location *psLoc;
...
psLoc = (struct Location*)malloc(sizeof(*psLoc));
/* psLoc = (struct Location*)malloc(sizeof(struct Location)); */
...
(*psLoc).iLat = 50;
psLoc->iLon = 120;
...
free(psLoc);
...
```

Dynamic Memory Reallocation for Arrays

```
int *pi;
...
pi = (int*)calloc(5, sizeof(*pi));
...
pi = realloc(10 * sizeof(*pi));
...
free(pi);
...
```