

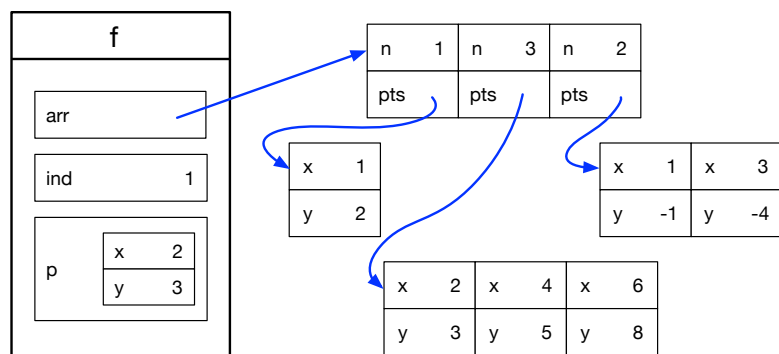
Code Pictionary

Below is a fragment of code with certain lines (that you will reconstruct) removed:

```
1 struct point_tag {
2     int x;
3     int y;
4 };
5 typedef struct point_tag point_t;
6
7 struct point_array_tag {
8     // struct fields omitted
9     // fill in for part 1
10 };
11 typedef struct point_array_tag point_array_t;
12
13 /* function takes an array of points 'arr' and adds
14    the specified point 'p' to the point array
15    at index 'ind' */
16 void f(point_array_t * arr, size_t ind, point_t p) {
17     // lines of code in f omitted
18     // fill in for parts 2 and 3
19     //
20 }
```

To aid you in reconstructing the code, we have given you two diagrams of the program state (shown on the following page). The first shows the state of the program immediately prior to the execution of line 17, while the second shows the state immediately after the execution of line 17.

1. The `struct point_array_tag` has two missing lines (each declaring a field in that struct). What are these two missing lines?
 - (a)
 - (b)
2. The function `f` is missing three lines of code. The first of these is line 17, which has the effect of transforming the “before” state above to the “after” state above. What is the missing line 17?
3. Lines 18 and 19 would finish placing the `point_t p` into the proper position in the array and updating any other states necessary. What are lines 18 and 19?
 - (a)
 - (b)



before

after

