Week 6 Section Handout
This week’s section handout has practice with Sorting, Linked Nodes & Memory.

1. Sorting
Trace the complete execution of the merge sort algorithm. Show the sub-vectors that are created by the algorithm and show the merging of sub-vectors into larger sorted vectors.

{29, 17, 3, 94, 46, 8, -4, 12};

2. Linked node before/after
Write the code that will produce the given “after” result from the given “before” starting point by modifying links between the nodes shown. There may be more than one way to write the code, but do NOT change any existing node’s data field value.

Before
a) list → 5 → 4 → 3
b) list → 5 → 4 → 3

After
list → 3 → 4 → 5
list2 → 4 → 3 → 5

3. Hogwarts - Pointer trace
Trace through the following function and draw the program’s memory at the designated spot. Indicate which variables are on the stack and which are on the heap, and indicate orphaned memory. Indicate with a question mark (?) memory that we don’t know the values of.

```c
struct Quidditch {
    int quaffle;
    int *snitch;
    int bludger[2];
};

void gryffindor() {
    Hogwarts *triwizard = new Hogwarts[3];
    triwizard[1].wizard = 3;
    triwizard[1].potter = NULL;
    triwizard[0] = triwizard[1];
    triwizard[2].potter = hufflepuff(triwizard);
    triwizard[2].potter->quaffle = 4;
    //DRAW THE MEMORY AS IT LOOKS HERE
}
```

```c
struct Hogwarts {
    int wizard;
    Quidditch harry;
    Quidditch *potter;
};
```

```c
Quidditch *hufflepuff(Hogwarts *cedric) {
    Quidditch *seeker = &(cedric->harry);
    seeker->snitch = new int;
    *(seeker->snitch) = 2;
    cedric = new Hogwarts;
    cedric->harry.quaffle = 6;
    cedric->potter = seeker;
    cedric->potter->quaffle = 8;
    cedric->potter->snitch = &(cedric->potter->bludger[1]);
    seeker->bludger[0] = 4;
    return seeker;
}
```

Thanks to CS106B and X instructors and TAs for contributing problems on this handout.
<table>
<thead>
<tr>
<th>Stack</th>
<th>Heap</th>
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