Exercises

1. (5 pts) Suppose we used locations 0 through \( n - 1 \) as the heap locations instead of 1 through \( n \). For a value at location \( i \), what are the array locations of its parent, its left child and its right child?

**Solution:** The left child is at location \( 2i + 1 \) and the right child is at location \( 2i + 2 \).

2. (10 pts) Show the array contents for the binary heap after each delete\_min operation.

```plaintext
insert 8, insert 12, insert 7, insert 5, insert 17, insert 1, delete\_min,
insert 6, insert 22, insert 14, insert 9, delete\_min,
delete\_min,
```

**Solution:** After the first delete\_min, the contents are, in order starting from location 1:

5, 7, 8, 12, 17

After the second delete\_min, the contents are, in order starting from location 1:

6, 7, 8, 9, 17, 12, 22, 14

After the third delete\_min, the contents are, in order starting from location 1:

7, 9, 8, 14, 17, 12, 22