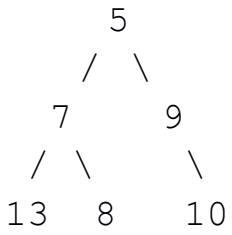
Name:_____ Lab Section:_____

Quiz 4B – November 22

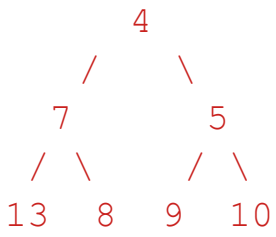
CS 2102 B19

1. (3 points) Imaging we have the following heap:



Draw the heap that results after we add 4 to the above heap.

One possibility:



Rubric:

3 points all or nothing. The heap must be valid, must have the 4 as the root, and must include all of the numbers from the original heap. Do not deduct points if the student uses a max heap instead of a min heap.

2. (2 points) What is the Big-O of adding a value to the beginning of a LinkedList? Briefly explain how you know.

O(1). This is because, regardless of the size of the list, adding an item to the front of a LinkedList takes the same amount of time.

Rubric:

+1 O(n)

+1 Proper explanation

3. (5 points) Alter the code below to improve encapsulation. You do not need to rewrite all of the code. You are free to cross things out and to draw arrows to show your changes.

```
class Enterprise {
	private String shipNumber;
	private String captain;
	private double maxWarp;

	//constructor omitted to save space

	public String makeItSo() {
		String s = "Ensign, go to warp " + this.maxWarp;
		return s;
	}

	public String getCaptain() {
		return this.captain;
	}
}
class Starfleet {

	private Enterprise ent;

	//constructor omitted to save space

	public String hailEnterprise() {
		String s = "Send a hail to " + this.ent.getCaptain();
		return s;
	}
}
```

Rubric:

+2 for setting all fields to private (-0.5 for each one missed)

+2 for correct getter method

- -1 if getter not in `Enterprise` class
- -0.5 if return value not specified or incorrect
- -0.5 if parameter not empty
- -0.5 if method is not public

+1 getter method called inside `hailEnterprise()` instead of `captain` field being changed directly

-2 if student provides (correct) written explanations instead of writing code

Do not deduct points for syntax errors or extra (i.e. unnecessary) code.