1. What is the main idea behind Huffman encoding? Why did Huffman start thinking about an encoding problem?

2. Given the tree below, write the Huffman encodings for the word "hope" and "shore".

```
0 1
```

```
'g' 'o'
```

```
'p' 'h' 'e' 'r'
```

```
's'
```

```
rope
```

```
shore
```

3. A Dictionary is an ADT that holds key/value pairs and provides the following operations:

```
put(key, value)
```

makes an entry for a key/value pair

assumes key is not already in the dictionary

```
get(key)
```

looks up key in the dictionary

returns the value associated with key (and None if not found)
Implement the Dictionary ADT.

Usage:

```python
>>> d = Dictionary(7)
>>> d.put('five', 5)
>>> d.put('three', 3)
```

Hint:

```python
>>> d._pairs
["five", 5], ["three", 3], None, None, None, None, None]
```

4. Modify the dictionary to use the following hash function:

```python
def hash(key):
    return len(key) % len(self._pairs)
```