1. Here is a function that returns the sum of a list of numbers:

```
def sum(values):
    result = 0
    for v in values:
        result = result + v
    return result
```

   Using `sum` as a prototype, write a function `product` that returns the product of its values. Be sure to test it!

2. Here is a function that returns the longest word in a list of words:

```
def longest(words):
    result = words[0]
    for w in words:
        if len(w) > len(result):
            result = w
    return result
```

   Using `longest` as a prototype, write a function `shortest` that returns the shortest word in a list.

3. Write a function `average` that returns the average (mean) of a list of numbers.

4. Write a function `dice` that repeatedly rolls two (six-sided) dice 10,000 times and counts the number of times each sum comes up. The output of your function will vary from one run to another, but should look something like this:

```
2:      282
3:      568
4:      863
5:      1115
6:      1359
7:      1664
8:      1360
9:      1087
10:     842
11:     588
12:     272
```

   Hint: use a dictionary and the `randint` function from the `random` module.

5. Here is a program that plays a number guessing game with the user:

```
print("Think of a number between 1 and 1000.")
min = 1
max = 1000
while (min < max):
    guess = (min + max) // 2
    answer = input("Is it more than {} (y/n)? ".format(guess))
    if answer == "y":
        min = guess + 1
    else:
        max = guess
# At this point min and max must be the same
print("Your number is {}.".format(min))
```

   This program works fine as long as the user follows the instructions precisely, but it interprets things like `yes`, `yeah`, and `Y` as negative answers. Using the `lower` and `startswith` methods, improve the program so that it handles these answers correctly. Hint: if you don't know how these work, try Googling something like `Python lower`. Real programmers do this constantly.

What to hand in: a Python file `a1.py` containing your four functions with the code for the number guessing game at the end.