Midterm review: Some small programs in Python

These programs will not be collected or graded. You should be able to do all of these programs.

1. Ask the user to enter a number >= 0. Continue accepting input as long as the user enters whole numbers >= 0. The user should enter a whole number < 0 to stop. Report to the user how many numbers were entered, the largest and smallest numbers entered, the sum of the numbers entered, and their (floating-point) average.
2. Display the value of pi to a number of decimal places (up to 10) specified by the user.
3. Ask the user to enter some text. Continue accepting text until the user enters an empty line to indicate they're ready to quit. Remove all punctuation and numbers from the user's text, and report how many lines, how many words, and how many unique words (disregarding upper- or lower-case) were entered.
4. Let X = 100 and call this the first number. Ask the user to continue entering numbers, until the average of all the numbers entered is less than 50. Report how many numbers were entered and the final average.
5. Write a function that takes a string representing a line of text as its parameter. It should return the number of words in the text. Write a program to test your function.
6. Write another function that calls the function you wrote in problem 5. This function takes a list of strings as its parameter and returns the number of words in the list. Write a program to test this function.
7. Craps is a dice game played as follows: The player rolls 2 ordinary 6-sided dice and takes the sum. If the player rolls a 2, 3, or 12, she loses immediately. If she rolls a 7 or 11, she wins immediately. If she rolls anything else, she must roll that value (her *point*) again before rolling a 7. (In this case, 2, 3, or 12 do *not* lose immediately, and 11 does *not* win immediately. When the player is trying to make her point, the point wins, a 7 loses, and the player rolls again on anything else.) This is NOT the full casino version of the game, which has several additional variations. Write a program that simulates a game of craps, reporting the result after each round and whether the player wins, loses, or rolls again.
8. Using the data file from homework program 3, report how many patients were tested (rows other than the first).
9. Modify the code from class using the EPA data file, to report the 20 cars with the highest gas mileage.
10. Write a program asking the user to enter two strings. Report whether or not the strings are anagrams. Remember that this comparison is case-insensitive, and all whitespace and punctuation should be removed before doing the comparison.
11. Write a program asking the user to enter a string. Report whether the string is a palindrome. This is also a case-insensitive comparison with whitespace and punctuation removed.
12. Write a program that reads a text file and prints (in alphabetical order) all the unique words in the file, with numbers and punctuation removed, all words in lower case.
13. Using the input file from program 3, report the average weight of the sample population.
14. A hare number is defined as an integer > 0 in which the last digit of the number (in normal base-10 notation) is equal to the number of digits in the number. Write a function to determine if a number is a hare number, and a program to test the function.

15. Write a program that asks the user to enter a file name. Files names ending with '.txt' or '.doc' are documents; file names ending with '.xls' or '.ods' are spreadsheets; file names ending with '.jpg' or '.gif" are images; other files are unknown. Report the type of file the file name represents.
16. Write a program asking the user for the title of their novel and the width of a line of text. Put the title into the correct case and print it centered on a line of the specified length.
17. Write a program that checks if the number N is prime. A simple approach checks all numbers from 2 to N-1 to see if they're factors of N, but in reality, no number larger than the square root of N need be checked.
18. Here's something from the NPR radio show *Car Talk*: My car's odometer measures distance traveled in whole numbers up to 999,999—no tenths of miles. Last week I was driving and noticed that the last 4 digits, but not the last 5, formed a palindrome; that is, they read the same forward and backward, like 1221. After one mile went by, the last 5 digits formed a palindrome, and after one more mile, the middle 4 digits formed a palindrome. Finally, when the third mile rolled over, all 6 digits formed a palindrome. What was my mileage when I first noticed these palindromes?
19. Solve the puzzle:

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  SEND
+MORE
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MONEY
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    Your basic approach is brute force—try all possibilities. A little logic should convince you that all of the numbers (except maybe Y) must be nonzero, and M must be 1. Other than that… try things out.
20. Write a program to determine how many times the word "Spam" appears (properly capitalized) in a string. Test it using some items from the menu in the Monty Python sketch:

    "There's Spam, egg, bacon and Spam, that's not got much Spam in it."
    "Not as much as the Spam, egg, Spam, sausage and Spam."
    "Do you have anything without Spam in it?"
    "I'm having the Spam, Spam, Spam, Spam, baked beans, Spam, Spam, Spam, and Spam."

    a. Given the above input, write an expression using the string's replace() method to report what the customer will get if an item is off the menu (because the restaurant ran out) and the customer asks for Spam instead.