

**Part A:** Write a Python program that prompts the user for a package weight and prints the shipping charge according to the following table:

Weight of Package	Rate per Pound
2 pounds or less	\$1.10
Over 2 pounds, but not more than 6 pounds	\$2.20
Over 6 pounds, but not more than 10 pounds	\$3.70
Over 10 pounds	\$3.80

Test your program thoroughly to make sure that it works correctly. Record the package weights you used to test your program and their corresponding shipping charges in the following table:

Weight of Package (input)	Shipping Charge (output)

**Part B:**

Copy the countDown.py program from P:/Math-CS/810-051-fienup/common/lab3/countDown.py. Run the countDown function with a couple of values, say 5, and 10.

Observe that the countDown function is a simple recursive program that calls itself. Most recursive functions solve a problem by splitting the problem into one or more simpler problems of the same type. For example, countDown(5) prints the first value (i.e, 5) and then solves the simpler problem of counting down from 4. To prevent “infinite recursion”, if-statement(s) are used to check for trivial base case(s) of the problem that can be solved without recursion. Here, when we reach a countDown(0) problem we can just print “BLAST OFF!!!”.

a) Trace the function call countDown(5) on paper by drawing the run-time stack and showing the output.

b) What do you think will happen if your call countDown(-1)?

c) Try it and wait until you get an error message. What is the error message?

d) Why is there a limit on the depth of recursion?

**Part C:**

You are to write a recursive function, `power(x, y)` that takes two parameters and returns  $x^y$ , where  $x$  is some number and  $y$  is a non-negative integer. (Yes, I know we could just use `x ** y`, but don't.) Some steps to help you:

- consider an example, say  $3^5$ , which means  $3 * 3 * 3 * 3 * 3$
  - think about how you might calculate the value of  $3^5$  recursively, i.e., how you might calculate the value of  $3^5$  if you knew the answer to a smaller problem say  $3^4$ ?
  
  - think about what base case(s) are trivial enough that the answer is obvious, i.e., what power(s) of 3 is simple to solve?
  
  - write the recursive function using some variation of the if-statement
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**When you are done with all three parts, hand in the following:**

- A) Program and table of test cases for part A
- B) Answers to questions (a) to (d) of part B
- C) Your recursive function `power` for part C.

If you don't get all three parts done, don't worry about it. You can ask me questions if necessary. Try to have the lab completed by next lab.