

Recursive Lab

For this lab, you will write a recursive function.

Program Requirements

Write a recursive function with two parameters, base and power. You do not need to verify that they are integers.

Your function is to return base raised to power, by using the following algorithm. Remember that $\text{base}^{\text{power}}$ is actually $\text{base} * \text{base} * \text{base} * \dots * \text{base}$ power times.

While there are several ways to compute this, such as using the built-in exponent operator `**` or using an iterative or recursive function to do the proper number of multiplies, for this lab you are to use the following approach so that the number of recursive function calls is minimized.

Consider the following:

X^{15} is $X * (X^{14})$
 X^{14} is $(X^7) * (X^7)$
 X^7 is $X * (X^6)$
 X^6 is $(X^3) * (X^3)$
 X^3 is $X * (X^2)$
 X^2 is $X * X$
 X is X

Note that if we do this as a recursive function, we have 7 function calls instead of the 15 it would take if we just did the multiplication. Look at this example and see if you can recognize the pattern and see how it treats odd exponents differently than even exponents. Once you see this, you should be able to code your recursive function.

For this lab, any exponent less than 0 should return 1 as its default behavior.

Required tests

Base	Exponent	Return Value
5	1	5
2	13	8192
3	6	729
5	8	390625
27	0	1
13	-1	1