

Homework 5

Due Friday, October 29, 2021

Math 205

1. Type in the functions `is_square` and `is_sum_of_two_squares` that we discussed together, and improve them if you want. Test them on a few examples, including the ones on the board.
2. How many numbers less than 100 are squares? How many are sums of two squares? Less than 1,000? Less than 10,000? Can your code deal with 100,000, or is it too slow?
3. Last week we studied the distribution of last digits of primes when written in base 10, and found that they were pretty evenly distributed. Do the same thing with squares and sums of two squares, up to 10000:

last digit:	# of squares:	# that are sums of two squares:
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		

4. Do the same thing in base 4, and at least two other bases between 4 and 10. Do you find interesting behavior?
5. For sums of two squares in base 4, the distribution of last digits is quite uneven. Can you point to a reason that it's distributed like this?
6. If you have time, write two more functions, `is_sum_of_three_squares` and `is_sum_of_four_squares`, and repeat the experiments above with them.