

Challenge 1

Write a function $[x] = \text{divide}(a, b, k)$, where $a, b \in \mathbb{R}^+$, $k \in \mathbb{Z}^{\text{nonneg}}$, such that x is an approximation of a/b to k decimal points. (Without using a built-in divide function.)

If the user enters a parameter that is not of the correct type, such as $\text{divide}(0, 1, -1)$, your code should terminate and remind the user of the accepted input.

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Challenge 2

Write a function $[\text{day}] = \text{weekday}(M, D, Y)$, which tells you the day of the week on date M/D/Y. Tell your user what the accepted date ranges are.

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Challenge 3

You enter a dark room with two tables in it. One table has 100 coins on it, 20 of which are Tails up. The other table has no coins. You cannot see (or feel) which coins are H or T. You are allowed to flip coins over, and move them from one table to the other. Can you make sure that both tables have the same number of Ts on them?

Program the table puzzle, i.e. write a function that takes as input a list of length 100, which has exactly 20 entries that are 1, and 80 that are 0. Then, using only “flips” and “moves”, and without using of the information in the input list, outputs two lists with the same number of 1s. Do this by writing the “flip” and “move”, first, as separate subroutines.

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Challenge 4 ★

Write a function that finds the length of a longest path: $(a : b) - (b : c) - \dots$, in a dictionary.

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Challenge 5 ★

Write a function that uses only “fair coins” to generate a “biased coin” with success probability $1/3$. Think about its runtime.

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