

# HW2

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**Due** Oct 2 by 11:59pm    **Points** 100    **Submitting** a file upload    **File Types** r and r

**Available** Sep 21 at 12am - Oct 2 at 11:59pm 12 days

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This assignment was locked Oct 2 at 11:59pm.

## Instructions

- Submit by the deadline announced on Canvas. Late homework will be penalized for **10%** points per day (from day 0).
- Note that the online submission will be closed automatically after the deadline, and no late submissions will be allowed online. Before the deadline, you may submit replacements.
- Please start working on this early, even though the deadline is in a week. It is hard to predict what kind of bugs will come up!
- You are allowed (also encouraged) to work in teams and discuss with other students. Each team can have any number of members. However, each student should write their own solutions and submit on Canvas.
- Please submit your R codes in a **single** .R file that contains your functions only. Please do not submit the input and output files unless required by the problem.
- If you use other packages that are not default in R, you need to write lines to **install** (e.g. via `install.packages()`) the packages first in your .R file and then **load** them (e.g. `library()`).
- Please don't submit PDF, R markdown, or other format files. We only need the functions that you write for each problem that can be loaded into R automatically. Problem 2 below provides example submission files.
- If we cannot run your function automatically (as those example submission files in Problem 2 below) for any reason (e.g. missing packages, wrong file formats, errors, and etc), your submission will receive a **10%** penalty for manual grading this time and this penalty will increase for future homework assignments.

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## 1. Recursion

A kid is playing a game to climb a staircase. It takes  $n$  steps to reach the top. Each time this kid can jump either 1 or 3 steps only. In how many distinct ways can this kid climb to the top?

Write an R function named `num_step_ways` that returns the number of distinct ways.

Function format:

```
Input: single numeric integer
Output: single numeric integer
```


Examples:

```
Input: 2
Output: 1
Explanation: 1+1
```

```
Input: 4
Output: 3
Explanation: 1+1+1+1, 1+3, 3+1
```

## 2. Function and Environment

Students submitted their coding homework solutions in single .R files. Within each file, students set `author` variables to be their UTH email addresses and write functions with specific names as required by assignments. Write an R function `grader` to evaluate students' submissions with a solution .R file, which also contains several testing inputs.

On Canvas, an example folder [hw2\\_grader.zip](https://uth.instructure.com/courses/64559/files/4235352/download?download_frd=1)  ([https://uth.instructure.com/courses/64559/files/4235352/download?download\\_frd=1](https://uth.instructure.com/courses/64559/files/4235352/download?download_frd=1)) is provided that contains students' submissions and a solution file. Your function should not start checking until it is called. Please output a CSV file with the following columns: email, problem function name, ratio that the output by a student's function matches the output from the solution, and total time used for running a student's function. You may assume that the function runs in the same example folder so no need to change directories.

Example output:

```
student1@uth.tmc.edu,roman_trans,0,0.262
student2@uth.tmc.edu,roman_trans,1,0.368
student3@uth.tmc.edu,roman_trans,1,0.287
student4@uth.tmc.edu,roman_trans,1,5.534
student5@uth.tmc.edu,roman_trans,1,0.571
```

