

Suppose an instructor gives an exam to a group of students. Four students named Ryan Reynolds, Sam Snead, Trent Tomlinson, and Ursula Under, forgot to put their names on their tests and the instructor cannot identify whose paper is whose. If she randomly assigns one test to each of these four students, how many students would you expect to receive their correct test? How often would all of the tests go to the wrong student? We will address these questions in 2 ways: through the use of simulation and through exact calculation.

- Your instructor will describe a method of simulating the process of randomly assigning tests to students using index cards and a sheet of paper.

Repeat this simulation 10 times, recording your results in the table to the right.

	Trial Number									
	1	2	3	4	5	6	7	8	9	10
# Matches										

- Combine your results on the number of matches with the rest of the class to get a tally of how often each outcome occurred. Record the counts and proportions in the table to the right.

# of Matches	0	1	2	3	4	Total
Count						
Proportion						1.00

- In what proportion of cases did at least one student get their correct test?
- Is it impossible to get 4 matches? Unlikely? Explain briefly.
- Let “RSTU” represent the “perfect return”, where everyone gets their correct exam back. Then “SRTU” represents the case where Sam’s test went to Ryan, Ryan’s test went to Sam, and Trent & Ursula both received their correct test. All of the 24 possible assignments are given below. For each of these arrangements, indicate how many correct matches there were [2 cases are given].

RSTU: 4	RSUT: 2	RTSU	RTUS	RUTS	RUST
SRTU	SRUT	STRU	STUR	SURT	SUTR
TRUS	TRSU	TSUR	TSRU	TURS	TUSR
URTS	URST	USRT	USTR	UTSR	UTRS

- In how many arrangements is the number of “matches” equal to exactly:

0: 1: 2: 3: 4:

- What proportion of all possible arrangements have the following number of “matches”?

0: 1: 2: 3: 4:

Are these exact proportions similar to the simulated proportions found in the table of part (2)?

- Based on the simulation results in part (2), how many students do we expect to receive the correct test in the long run?
- Based on the exact proportions found in part (7), how many students do we expect to receive the correct test in the long run?