

Computational Thinking and Mathematical Problem-Solving

Changing the Culture Conference, SFU

May 16, 2025

Richard Hoshino, Teaching Professor
Northeastern University (Vancouver)

r.hoshino@northeastern.edu www.richardhoshino.com

Thank you for coming today! Together we'll explore three beautiful problems.

The Biased Lottery

You are on a 7-person team. It costs your team \$200 to play this Lottery game.

Each of you gets a ticket, consisting of three numbers from $\{1,2,3,4,5,6,7\}$.

I then draw the winning combination, which will be three numbers from this set.

Each ticket matching all 3 numbers wins \$210. Each ticket matching 2 out of 3 numbers wins \$70.

Is it in your team's best interest to play this Lottery game?

If so, which seven tickets should your team pick?

The Roommate Scheduling Puzzle

Seven friends are living together and create a schedule to make dinner. Here are the rules.

- Each person must help with dinner (prep, cooking, cleaning) on three of the seven days.
- Each dinner must be prepared by exactly three of the seven people.
- Ideally, no pair of individuals works together more than once.

You are given one “penalty point” for each instance where two people work together more than once. For example, the schedule on the right meets all of the required conditions, and has 7 penalty points (e.g. Asmita and Bernard working together on Tue and Wed).

	Mon	Tue	Wed	Thu	Fri	Sat	Sun			Mon	Tue	Wed	Thu	Fri	Sat	Sun
Asmita									Asmita	x	x	x				
Bernard									Bernard		x	x	x			
Cathery									Cathery			x	x	x		
David									David				x	x	x	
Edward									Edward					x	x	x
Frederic									Frederic	x					x	x
Gina									Gina	x	x					x

Can you find a better solution with fewer than 7 penalty points? If so, what is the optimal solution?

The Spot It Game

For each pair of cards, there is exactly ONE symbol common to both cards.

For each pair of cards, can you “spot it”?

