

# Spring 2019

## Barge Problem 6

**A coin flipping game.** Spring break is still over, and Allie and Karimah decide to celebrate their return to classes by playing a coin flipping game. A fair coin will be flipped over and over. Allie wins if the coin comes up HHH on any three consecutive flips, and Karimah wins if it comes up THH in three consecutive flips. The game ends as soon as either HHH or THH appears for the first time.

1. What are the chances Allie will win this game?
2. After playing a few games, Allie decides to choose a different sequence: THT. After Allie tells Karimah her sequence, Karimah chooses her sequence of three flips. What sequence should Karimah choose to maximize her chances of winning?
3. Allie and Karimah chat about the game.



Allie: I wonder what the best sequence is?

Karimah: I don't know. Maybe there isn't one. Maybe, no matter what sequence of 3 flips you choose, I can find a 3 flip sequence that is better.

Your job: First, answer the first two questions, with justification. Next, is there is a 'best' sequence? If so, find it, with explanation, and let Allie know. If not, then show that no matter what sequence Allie picks, Karimah can find one that's better. (For this problem, interpret "better" as follows: sequence *aaa* is *better* than *bbb* if the probability that *aaa* comes up before *bbb* is greater than 50%.)

### Barge Prizes

First Prize	\$750
Second Prize	\$600
Third Prize	\$450

1. Form a team with other Lafayette students. Each team must have 3, 4 or 5 members.
2. Solve the Problem of the Week with your team. The weekly problem will be posted on the department web page and in the Math Dept. There will be 8 problems during the semester.
3. Get your solution to Gary Gordon by Saturday, April 13. You can either turn in a hard copy or send your solution by email to [gordong@lafayette.edu](mailto:gordong@lafayette.edu).
4. Don't Quit! Keep turning in problems, even if you're not 100% sure of your solution.

**Deadline: Saturday, April 13.**