

Andrew, the Pancake Cook

BEAR RESORT - WEEKLY MATH QUIZ

Say Andrew is making some pancakes for his suite-mates. For each pancake, he needs to fry both sides of the pancake for 1 minute to make it well-cooked.

Now, suppose that Andrew has a pan that can heat two pancakes (one of their sides) at the same time.

Problem 1. What is the shortest time for Andrew to prepare 2 pancakes, well cooked, for himself and Justin? How shall he arrange the pancakes on the pan?

This situation is, in fact, too easy, and it did not ended up being the case. There comes James, the *uninvited guest*, getting into their house. He also wants a pancake.

Problem 2. What is the shortest time for Andrew to prepare 3 pancakes, well cooked, for himself, Justin, and James? How shall he arrange the pancakes on the pan?

Unexpectedly, the story did not end. The big guy, Brian, would came back later from *workout*, and he could eat as many pancakes and possible, but definitely at least 2 pancakes. In order to fulfill this big guy, Andrew need to think of a general strategy of making pancakes so he can feed Brian as fast as possible.

Problem 3. Give a strategy to Andrew to prove that: As long as Brian is requesting at least 2 pancakes, Andrew is able to produce that number of pancakes with the average speed of 1 pancake per minute.

It is well known that James, the picky guy, is critiquing Andrew for the strategy of making pancakes. He claims that the pancake should have its first side fried for 1 minute, and the other side only need to be fried for $1/2$ minutes, so that the pancake is the best cooked.

Problem 4. Give Andrew a fastest strategy to arrange the pancakes so James would be satisfied.

Hint: Consider odd and even cases separately.

Justin, after taking EN.601.220 Intermediate Programming, learned C++ and wrote a program for people to order pancakes online, so a person can order *exactly* 2 pancakes online and have Andrew's crew to delivery the pancakes to their house. For simplicity, let's say that Andrew has so many friends so that he does not need to worry if there is no one available for delivery.

Also, Andrew revoked James' proposal of frying two sides with different times, but rather just fry each side with $3/4$ minute. Now, Andrew immediately received many orders with customers living at different locations that require different amount of time to get to.

Problem 5. Design an algorithm for Andrew to cook and deliver the pancakes so the last customer to receive the pancake will have to wait for the least amount of time.