



## A • FOUR QUARTERS

### Problem

*Four Quarters* is a game of chance played with, well, four quarters. Two people, called A and B, each flip two quarters each round. They each gain or lose points each round based on the following tables:

|          |    | Player B |    |    |
|----------|----|----------|----|----|
|          |    | HH       | HT | TT |
| Player A | HH | 1        | 1  | 2  |
|          | HT | 0        | 0  | 1  |
|          | TT | -1       | 0  | 0  |

**Player A's payoff**

|          |    | Player B |    |    |
|----------|----|----------|----|----|
|          |    | HH       | HT | TT |
| Player A | HH | 0        | -1 | -1 |
|          | HT | 1        | 0  | 0  |
|          | TT | 2        | 0  | -1 |

**Player B's payoff**

There is no difference between Heads/Tails and Tails/Heads. As you can see, the odds are stacked in Player A's favor. At the beginning of the game, each player has 0 points, and points accumulate as the game progresses. At the end of the game, whichever player has the most points wins.

You must write a program that determines the probability that Player A will win, Player B will win, or they will tie, after a certain number of rounds. Assume that the coins are fair, i.e. that heads and tails are equally likely.

### Input

There is no input file for this problem.

### Output

Output a table that lists the probability that Player A will win, B will win, or they will tie, after each round for 1 to 20 rounds. The output for rounds 1 through 3 is given below.

Probabilities must be expressed as a percent, with 4 places after the decimal.

| Round | A wins   | B wins   | Tie      |
|-------|----------|----------|----------|
| 1     | 43.7500% | 18.7500% | 37.5000% |
| 2     | 56.6406% | 22.2656% | 21.0938% |
| 3     | 62.3535% | 22.7051% | 14.9414% |