Problem B: Two-card solitaire

Two card solitaire is played with a regular deck of 52 cards. In the deck there are 4 cards of each of 13 ranks: aces are worth 1, deuces are worth 2, and so on, up to kings worth 13. The goal of two-card solitaire is to get a hand with the highest **score**.

In two-card solitaire, the **score** of a hand is calculated as follows. If your two cards have different ranks (e.g. you have a card of rank 3 and a card of rank 5), your score is the sum of the two ranks (e.g. $3 + 5 = 8$). However, if your two cards have the same rank (e.g. both your cards are rank 9), then the score is the product of the two ranks (e.g. $9 \times 9 = 81$).

To play a hand of two-card solitaire, first you draw two random cards from a shuffled deck. You then have the choice to discard 0, 1, or both of your cards and replace them with an equal number from the remaining 50 cards in the deck. As an example, if you held two aces (each with rank 1, and current score of 1) you would consider discarding both. If you drew two queens (each with rank 12), you'd probably want to keep them.

The outcome of the game is random. However, if you play well, you can maximize your score on average. What's the average score of a hand of two-card solitaire, assuming that you play perfectly?

Solving this problem will earn you bonus marks in math class (pretty cool!). In fact, you solved the problem last week, and wrote the answer down on a piece of paper. Unfortunately, your dog ate the answer and ripped the paper to shreds, rendering the answer almost illegible. A couple of the digits can still be made out, though...

Input Specification:

This problem has no input.

Output Specification:

Output a single number with 6 decimal places: the average score of two-card solitaire, assuming perfect play.

Sample Input:

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**There is no input**
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Sample Output:

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24.5?????
(Your dog has left three digits legible.
However, the answer needs to be accurate to 6 decimal places, not 1.)
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