A raffle for the Ragin’ Grannies will work as follows. There will be 2000 tickets sold for $1 each. There will be one first prize of $600 and two second prizes of $200 each. You decide to buy a ticket. What is your expectation?

(Show all work including substitution in the expectation formula. Also, summarize the meaning of your answer with a complete sentence.)
Solution

1\textsuperscript{st} prize  2\textsuperscript{nd} prize  lose $ \\
\downarrow \quad \downarrow \quad \downarrow \\
E = P_1A_1 \quad + \quad P_2A_2 \quad + \quad P_3A_3 \\
E = \left( \frac{1}{2000} \right)(\$599) + \left( \frac{2}{2000} \right)(\$199) + \left( \frac{1997}{2000} \right)(\$-1) \\
E = 0.2995 + 0.199 - 0.9985 \\
E = 0.4985 - 0.9985 = -0.50 = -50 \text{ cents} \\
So, in summary, this means that if you were to play many such raffles, you would end up losing an average of 50 cents per raffle.