What is the expected value?

There are many occasions on which we want to predict how much we are likely to gain or lose if we take a certain action. We can do this by simply computing the mean of a random variable and the value of the mean is often called the expected value.

Finding Expected Value Using TI:

1. Clear all lists: 
   \[ \text{2ND} \rightarrow + \rightarrow 4: \text{ClearAllLists} \rightarrow \text{ENTER} \]
2. Enter net gains in L1, and corresponding probabilities in L2.
3. Perform basic computation: 
   \[ \text{STAT} \rightarrow \text{CALC} \rightarrow 1: \text{1-Var Stats} \rightarrow \text{L1, L2} \]
   - If you have a menu on your calculator, then use 
     \[ \text{List: L1, FreqList: L2, Calculate} \]
4. Expected Value is the value of \( \bar{x} \).

Example:

An insurance company sells a one-year term life insurance policy to Mrs. Young for a premium of $1000. If she dies within one year, the company will pay $25,000 to her beneficiary. Assume the probability that she will be alive one year later is 97.5\%, find the expected value of the profit.

Solution:

We begin by entering net gains and corresponding probabilities in L1 and L2:

<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>-1000</td>
<td>.975</td>
</tr>
<tr>
<td>25,000</td>
<td>-.975</td>
</tr>
</tbody>
</table>

Now perform basic computation as stated above to get \( \bar{x} = -375 \). The insurance company makes $375 per policy of this type.