

Expected Value - mean of a probability distribution

example: A lottery offers one \$1000 prize, one \$500 prize, and five \$100 prizes. 1000 tickets are sold. Find the expected profit if you buy one ticket. The ticket is \$3.

$X = \text{profit}$

$X$	$P(X=x)$	$X \cdot P(X=x)$
997	$\frac{1}{1000}$	.997
497	$\frac{1}{1000}$	.497
97	$\frac{5}{1000}$	.485
-3	$\frac{999}{1000}$	-2.979
		$\mu = -1$

example: \$250 premium for a \$100,000 life insurance policy. for a 21-year old man. A 21-year old man has a 0.9985 probability of living through the year. What is the expected value for a man that buys this policy?

	$X$	$P(X=x)$	$X \cdot P(X=x)$
lives	-250	.9985	
doesn't	99,750	.0015	
			$\mu = -100$

$X = \text{net payout}$

example: You buy a foreclosed property for \$50,000. You spend \$27,000 fixing it up. You believe that there is a 40% chance that you can sell the property for \$120,000. 45% chance that you can sell it for \$100,000, 15% chance you can sell it for \$80,000. What is the expected profit?

net  $X = \text{profit}$

$X$	$P(X=x)$	$X \cdot P(X=x)$
43,000	.40	17,200
23,000	.45	10,350
3,000	.15	450
		$\mu = 28,000$

Homework: 2, 3, 5 (Chapter 4)

	Sale	No Sale	Total
Aggressive	270	310	<u>580</u>
Passive	416	164	<u>580</u>
Total	686	474	<u>1160</u>

$$P(A \text{ or } S) = P(A) + P(S) - P(A \text{ and } S) = \frac{580}{1160} + \frac{686}{1160} - \frac{270}{1160}$$

$$= \frac{996}{1160}$$

↑ ↑  
 not mutually  
 exclusive -  
 they can happen  
 at the same time