3.2 Expected Value

The average, or **mean**, of n numbers x1, x2, …, xn is .

Ex 1. Students from a small college were asked how many charge cards they carry. X is the random variable representing the number of cards and the results are below. Find the average number of cards carried by students at the college.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| X | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| # people | 12 | 42 | 57 | 24 | 9 | 4 | 2 |

**Expected Value of Random Variable X**

With values x1, x2, …, xn and associated probabilities p1, p2, …, pn

Ex 2. A buyer for Discount Fashions is considering buying a batch of clothing for $64,000. She estimates that the company will be able to sell it for $80,000, $75,000, or $70,000 with probabilities of .3, .6, and .1 respectively. Based on these estimates, what will be the company’s expected gross profit?

Ex 3. A man purchased a $200,000, 1-year term-life insurance policy for $500. Assuming the probability that he will live another year is .998, find the company’s expected gain.

Ex 4. Jackson and Max are playing a dice game where a single die is rolled. Jackson pays Max $2 when a 1, 2, 3, or 4 is rolled and Max pays Jackson $D for a 5 or 6. Determine the value of D if the game is to be fair.

**Odds**  
If P(E) is the probability of an event E occurring, then

* Odds in favor of E = P(E)/P(Ec), and
* Odds against E = P(Ec)/P(E)

Ex 5. Find the odds of rolling a 3 on a fair die.

Ex 6. If P(E)= 0.3, find the odds in favor of E and against E.