# Expected Value
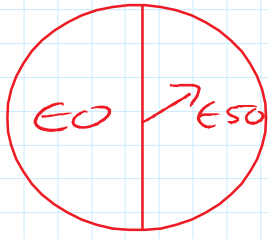


Cost €30 to play.
Will you play?

Win ~~Lose~~ ~~€250~~

$$\frac{1}{2}(0) + \frac{1}{2}(50)$$

$$0 + 25 = €25$$

Lose €5 ⟹ do not play.

1st        2nd

$$0 + 50 = \frac{€50}{2}$$

$$= €25$$

| Win | €1 | €2 | €3 | €4 |
|-----|-----|-----|-----|-----|
| Prob | 0.6 | 0.1 | 0.2 | 0.1 |

Cost €1.50 to play. Will you ?

10 games
$$6(1) + 1(2) + 2(3) + 1(4)$$
$$6 \quad \frac{~~6~~ ~~10~~}{10} 6 + 4 = €18.00$$

Per game win €0.30
$$0.6(1) + 0.1(2) + 0.2(3) + 0.(4) = €1.80$$

$$E(x) = \text{expected value}$$
$$p(x) = \text{probability}$$

$$x = \text{result}$$

$$E(x) = \sum (p(x))x = \sum x \, p(x)$$

$$\sum = \text{sum of}$$

$$1 + 2 + 3 + \cdots 8 + 9 + 10$$

$$\sum_{n=1}^{100} n = 1 + 2 + 3 \qquad\qquad + 98 + 99 + 100$$

Find $\qquad \sum_{n=1}^{10} n = 1 + 2 + 3 \cdots 9 + 10$

$$\sum_{n=1}^{4} n^2 = 1^2 + 2^2 + 3^2 + 4^2$$

$$\sum_{n=3}^{5} \frac{1}{n} = \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$$

| $x$ | 1 | 2 | 3 | 4 |
|-----|-----|-----|-----|-----|
| $P(x)$ | 0.5 | 0.2 | 0.1 | y |

Find

(1)  y

(11)  $E(x)$

$$y + p = 80 = 2$$

$$0.5(1) + 2(0.2) + 3(0.1) + 4(0.2)$$
$$= 2.$$