

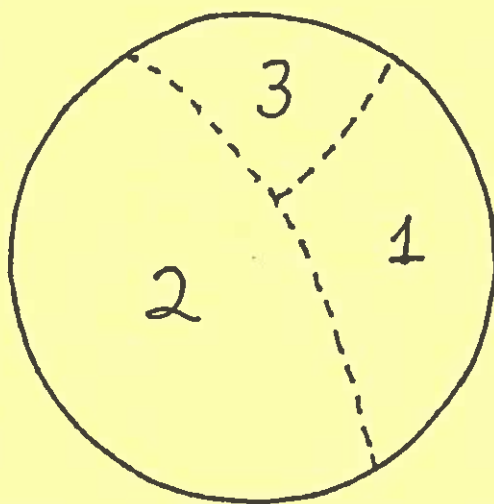
Math 16B

Kouba

Discrete Probability

Example : Consider the given dartboard with possible scores of 0 (miss), 1, 2, and 3. Let random variable X be the score for 1 dart, and assume that the probabilities are given below:

X	$P(X)$
0	0.07
1	0.30
2	0.52
3	0.11



Find the

- 1.) Mean (Expected Value), μ ,
- 2.) Variance, $V(X)$, and
- 3.) Standard Deviation, σ , of X .

$$1.) \mu = E(X)$$

$$= (0)(0.07) + (1)(0.30) + (2)(0.52) + (3)(0.11)$$

$$= 0.30 + 1.04 + 0.33$$

$$= 1.67 \text{ pts.}$$

$$2.) V(X) = (0 - 1.67)^2(0.07)$$

$$+ (1 - 1.67)^2(0.30) + (2 - 1.67)^2(0.52)$$

$$+ (3 - 1.67)^2(0.11) = 0.5811 \text{ pts.}^2$$

$$3.) \sigma = \sqrt{V(X)} = \sqrt{0.5811} \approx 0.76 \text{ pts.}$$

Example: Each week 1000 lottery tickets are sold for \$1 each. Fifteen (15) tickets are \$20 winners, five (5) are \$50 winners, two (2) are \$100 winners, and one (1) is a \$300 winner. If you buy one ticket, what is your expected NET monetary outcome?

Let random variable X be your NET gain. Then

<u>X (\$)</u>	<u>P(x)</u>
-1	977/1000
19	15/1000
49	5/1000
99	2/1000
299	1/1000

Expected Value

$$\mu = E(x) = (-1)\left(\frac{977}{1000}\right) + (19)\left(\frac{15}{1000}\right) + (49)\left(\frac{5}{1000}\right) + (99)\left(\frac{2}{1000}\right) + (299)\left(\frac{1}{1000}\right)$$

$$= \$ \frac{50}{1000}$$

$$= \$ \frac{1}{20}$$

$$= 5¢$$