8.3: Variance and Standard Deviation

EXAMPLE 1. *Find the mean and median of these data sets.*

(a) $50, 50, 50, 110, 110, 110$

(b) $70, 75, 75, 80, 85, 85, 90$

Variance of the random variable X, denoted $\text{Var}(x)$, measures the dispersion (or spread) of the data.

Standard Deviation, denoted σ, is another measure of dispersion (or spread) of a probability distribution about its mean:
$$\sigma = \sqrt{\text{Var}(X)}.$$

Finding expected value and standard deviation using the calculator::

1. Enter the x-values into $L1$ and the corresponding probabilities into $L2$ (STAT→1:Edit).

2. On the homescreen type 1-Var Stats $L1, L2$ (STAT→CALC→1:1-Var Stats)

3. $\bar{x}$ is the expected value

4. σx is the standard deviation

5. To find variance, you would need to recall that $\text{Var}(X) = \sigma^2$.

EXAMPLE 2. *The random variables X and Y have the following probability distributions:*

x	$P(X = x)$
1	*0.3*
2	*0.1*
3	*0.2*
4	*0.1*
5	*0.3*

y	$P(Y = y)$
1	*0.1*
2	*0.1*
3	*0.6*
4	*0.1*
5	*0.1*

(a) *Draw the histograms for X and Y.*

(b) *Find the mean, variance and standard deviation of X.*

(c) *Find the mean, variance and standard deviation of Y.*

EXAMPLE 3. *In a class of 100 students, define X as the random variable whose value represents the students grade in Math 141, $A = 4, B = 3$, etc. Compute the mean, and standard deviation.*

x	4	3	2	1	0
freq. of occurrence	15	29	40	12	4

EXAMPLE 4. *Amy is considering investing $5,000 in 2 mutual funds. The anticipated returns from price appreciation and dividends (in hundred of dollars) are described by the following probability distributions:*

MUTUAL FUND A

Returns	Probability
-2	0.25
4	0.45
5	0.3

MUTUAL FUND B

Returns	Probability
-2	0.2
3	0.4
4	0.4

(a) *Find the mean and variance with the returns for each fund.*

(b) *Which investment would provide Amy with the higher expected return?*

(c) *In which investment would the element of risk be less?*