Objective 3: I can find the mean, variance, and standard deviation of a discrete probability distribution.

You can measure the center of a probability distribution with its mean and measure the variability with its variance and stand. deviation (SD).

The formulas to find the mean, variance, and SD are below.

The mean of a discrete random variable is given by $\mu = \sum x \cdot P(x)$

*Basically, each value of X is multiplied to its probability and the products are added.

The variance of a discrete random variable is given by $\sigma^2 = \sum (x-\mu)^2 \cdot P(x)$

The stand. dev. of a discrete random variable is given by $\sqrt{\sigma^2}$ (square root variance)

Ex 6: Let's find the mean, variance, and SD of the probability distribution that showed the test scores for passive-aggressive traits.

x	1	2	3	4	5
$P(x)$	0.16	0.22	0.28	0.20	0.14

mean

variance

X	$P(X)$	$X \cdot P(X)$	$(X-\mu)^2 \cdot P(X)$
1	0.16	0.16	$(1-2.9)^2(.16) = .5776$
2	0.22	0.44	$(2-2.9)^2(.22) = .1782$
3	0.28	0.84	$(3-2.9)^2(.28) = .0028$
4	0.20	0.80	.242
5	0.14	0.70	.6174
		$\Sigma = 2.94$	$\Sigma = 1.618$ (σ^2)

$SD = \sqrt{1.618} = 1.3$

*The average score is 2.9, and most scores are within 1.3 units of the mean.

TIY 6: Find the mean, variance, and SD of the probability distribution in Ex 2 (below).

Sales per day, x	Number of days, f	$P(x)$	$x \cdot P(x)$	$(x-\mu)^2 \cdot P(x)$
0	16	.16	0	1.0816
1	19	.19	.19	.4864
2	15	.15	.30	.054
3	21	.21	.63	.0336
4	9	.09	.36	.1764
5	10	.10	.50	.576
6	8	.08	.48	.9248
7	2	.02	.14	.3872
	$\Sigma = 100$		$\Sigma = 2.60$	$\Sigma = 3.72$

mean

variance

$\mu = 2.6$

$\sigma^2 = 3.72$

$\sigma = \sqrt{3.72} = 1.9$

Pg 203 #29-31

(1) you'll need to find P(x) first.

* Each $P(x) = \frac{f}{\Sigma f}$

X	P(X)

Constructing Probability Distributions *In Exercises 29–34, (a) use the frequency distribution to construct a probability distribution, find the (b) mean, (c) variance, and (d) standard deviation of the probability distribution, and (e) interpret the results in the context of the real-life situation.*

29. Dogs The number of dogs per household in a small town

Dogs	0	1	2	3	4	5
Households	1491	425	168	48	29	14

$\Sigma f = 2175$

$\mu \approx 0.495 = .5$

30. Cats The number of cats per household in a small town

Cats	0	1	2	3	4	5
Households	1941	349	203	78	57	40

$\Sigma f = 2668$

$\mu = .529 = .5$

31. Computers The number of computers per household in a small town

Computers	0	1	2	3
Households	300	280	95	20

$\Sigma f = 695$

$\mu = .77 \approx .8$