

1. Explain the difference between population parameters and sample statistics. What symbols do we use for the mean and standard deviation for each of these?
2. Consider the following probability distribution function of the random variable X which represents the number of people in a group (party) at a restaurant:

X	P(X)	$xP(x)$	$x - \bar{x}$	$(x - \bar{x})^2$	$(x - \bar{x})^2 P(x)$
1	.10	.1	-2.55	6.5025	.65025
2	.25	.5	-1.55	2.4025	.600625
3	.20	.6	-0.55	.3025	.0605
4	.20	.8	.45	.2025	.0405
5	.10	.5	1.45	2.1025	.21025
6	.05	.3	2.45	6.0025	.300125
7	.05	.35	3.45	11.9025	.595125
8	.05	.4	4.45	19.8025	.990125
		$\mu = 3.55$			3.4475

- a. Find the population mean of X.

$$\mu = 3.55$$

- b. Find the population variance and standard deviation of X.

$$\sigma^2 = 3.45$$

$$\sigma = \sqrt{3.45} = 1.86$$

- c. Find the probability that the next three parties (assuming independence) will all be over 4.

$$P(X > 4) = .25$$

$$(P(X > 4))^3 = .015625$$

3. 70% of the US population are troubled by the economy. You randomly sample 20 people. Let X be the number in your sample who are troubled by the economy.

- a. What type of random variable is this? What are the parameters of the model?

$$\text{BINOMIAL } n = 20 \quad p = .7$$

- b. Find the population mean and standard deviation.

$$\mu = np = (20)(.7) = 14$$

$$\sigma = \sqrt{npq} = \sqrt{(20)(.7)(.3)} = 2.05$$

- c. Find the probability that exactly 15 people in your sample are troubled by the economy.

$$P(X = 15) = .179$$

- d. Find the probability that more than 15 people in your sample are troubled by the economy.

$$P(X > 15) = P(16) + P(17) + P(18) + P(19) + P(20) = .238$$

- e. Would it be unusual if only 7 people in your sample were troubled by the economy? Justify your answer.

$$P(X \leq 7) = .001 \rightarrow \text{this is highly unlikely.}$$