Lesson 6.3.1

6-84. a.

n	1	2	3	4	5	6
$t(n)$	0.16	0.1344	0.1129	0.09483	0.07966	0.06691

b. 1

6-85. a. All of the previous conditions for binomial are still met, but there are no longer a fixed number of trials. The number of trials until a "yes" is the random variable now!

b. The only way for the first "yes" to be on the fifth trial is to have: no, no, no, no, yes. Because the trials are independent, students can take
$0.84 \cdot 0.84 \cdot 0.84 \cdot 0.84 \cdot 0.16 = 0.07966$

c. From the table in problem 6-84:
$0.16 + 0.1344 + 0.1129 + 0.09483 + 0.07966 = 0.5818$

d. We are talking about the probability of the first "yes" being on the n^{th} trial. The possible outcomes are 1 to infinity. This represents the entire sample space. The sum of the probabilities of all possible outcomes must be 1.

e. $P(X > 5) = 1 - 0.5818 = 0.4182$

6-86. a. The random variable X represents the number of yes results observed out of a fixed number of trials.

b. There is no longer a fixed number of trials.

c. The random variable X represents the trial number on which the first "yes" is observed.

d. It only has one parameter: p.

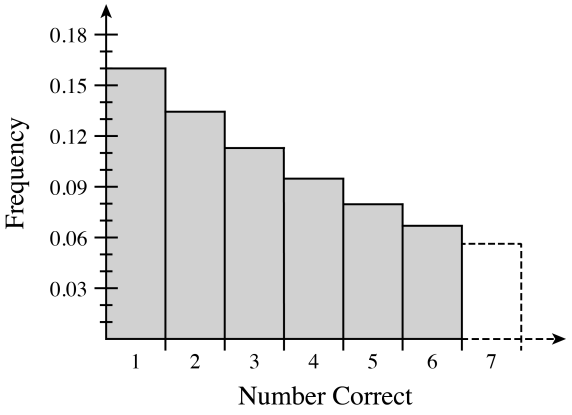
6-87. a. 0.07966: Yes, the result is the same.

b. 0.5818: Yes, the result is the same.

6-88. a. See the diagram at right. The shape is skewed to the right.

b. In Lana's situation, you would expect to answer 5 questions until the first "yes." This is $\frac{1}{0.2}$ or $\frac{1}{p}$.

c. The mean is 6.25 trees, and the standard deviation is 5.73 trees. We would expect to have to observe about 6 trees before the first infected tree is observed, but anything within about 5 to 6 trees of this expected amount is considered typical.



6-89. "Waiting periods help reduce suicides and other impulsive acts. Are you in favor of legislation that would establish a seven day waiting period between the time a gun is purchased and when it is physically transferred to the owner?" OR "If a criminal wants guns now, they can get them illegally and no waiting period is going to stop them. Are you in favor of legislation that would establish a seven day waiting period between the time a gun is purchased and when it is physically transferred to the owner?"

6-90. a. Geometric distribution, $p = 0.10$. $P(X > 15) = 1 - \text{geomcdf}(0.1,15) = 0.2059$

b. $\mu = \frac{1}{0.10} = 10$ boxes, and $\sigma = \sqrt{\frac{1-0.10}{0.10^2}} = 9.4868$ boxes. In other words, Kseniya should expect to open 10 boxes before finding the action figure that she wants. Anything within about 10 boxes of the expected amount (from the first box to the 20^{th} box) would be considered typical.

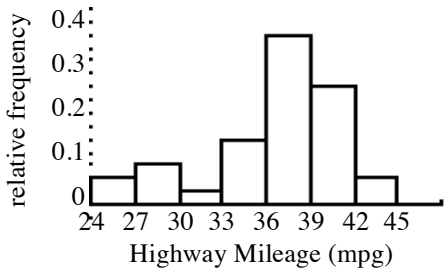
c. Binomial distribution, $n = 15$, $p = 0.10$; $P(X = 2) = 0.2669$

d. Binomial distribution: $\mu = 180(0.1) = 18$ boxes, $\sqrt{180(0.1)(1-0.1)} = 4.0249$ boxes.

e. Because students expect 18 "yes" results and 162 "no" results (both more than 10), students can assume that the number of boxes of cereal containing Kseniya's desired action figure is approximately normally distributed. Therefore, 95% represents two standard deviations on either side of the mean: (10, 26) boxes.

6-91. a. mean ≈ 36.11 mpg, sample standard deviation ≈ 4.626 mpg

b. See table at right and histogram below.



Highway Mileage (mpg)	f	relative frequency
24 to 27	2	$\frac{2}{35} = 0.0571$
27 to 30	3	$\frac{3}{35} = 0.0857$
30 to 33	1	$\frac{1}{35} = 0.0286$
33 to 36	15	$\frac{5}{35} = 0.1429$
36 to 39	13	$\frac{13}{35} = 0.3714$
39 to 42	9	$\frac{9}{35} = 0.2571$
42 to 45	2	$\frac{2}{35} = 0.0571$
total	35	1.00

c. $0.0571 + 0.0857 = 0.1428 = 14.28\%$

d. Counting the cars from either end of the mileage distribution, would show that the 18^{th} car would be in the middle. The 18^{th} car would also be in the 36 up to 39 mpg group.

e. $0.2571 + 0.0571 = 0.3142 = 31.42\%$