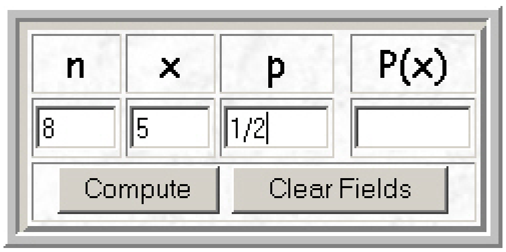
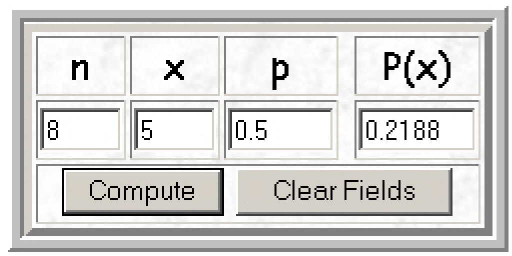
**SOLUTIONS - CHAPTER 9 QUIZ**

**9.1** This is a binomial experiment with our random variable, *X*, denoting the number of heads tossed. We have $n = 8$, $p = \frac{1}{2}$, and $x = 5$. So,

$$\begin{aligned} P(X = 5) &= C(8,5)\left(\tfrac{1}{2}\right)^5 \left(\tfrac{1}{2}\right)^{8-5} \\ &= \tfrac{7}{32} \\ &\approx 0.2188 \end{aligned}$$

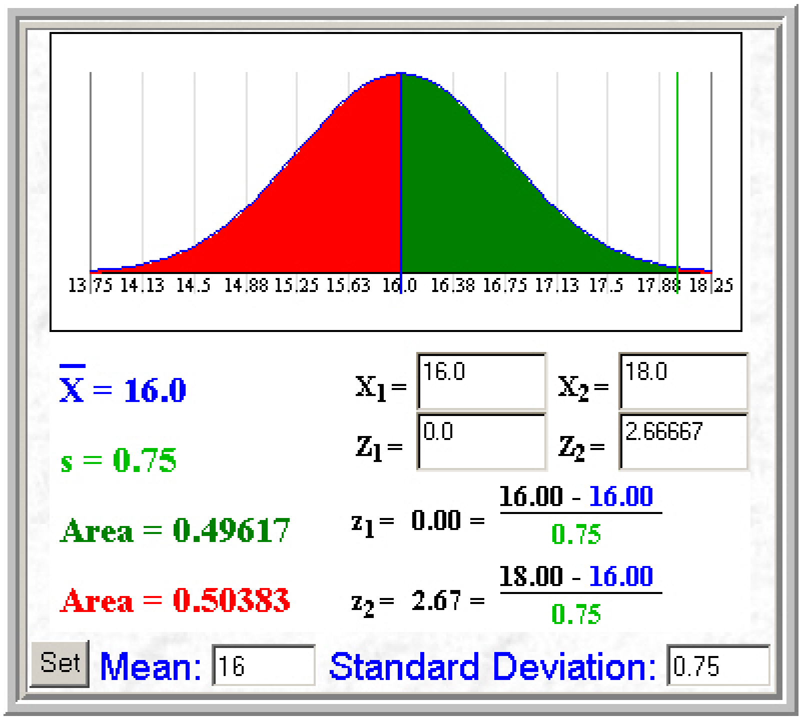
**Binomial Probability Calculator**




**9.2** We are looking for $P(16 \le X \le 18)$, where *X* is a normal random variable denoting the mean weight of a box of cereal and the mean value of *X* is 16 and the standard deviation of *X* is 0.75. Thus, we are looking for the area under the normal curve of *X* from *X* = 16 to *X* = 18.

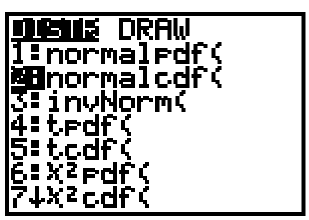
**Applet Method** First, set the mean at 16 and the standard deviation at 0.75. Then, set $X_1 = 16$ and $X_2 = 18$.

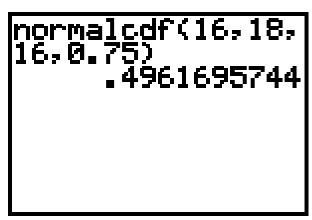



The green area gives our probability and therefore $P(16 \le X \le 18) = 0.4962$.

**Calculator Method (TI-83)** Use the built-in **normalcdf** function under **[2nd][VARS]**. The format for the function is the following:

$$normalcdf\left(X_1, X_2, \mu, \sigma\right)$$




Thus, we have $P(16 \le X \le 18) \approx 0.4962$.

**9.3** $X$ may take values in the set $\{1,2,\ldots\} = \{\text{All positive integers}\}$ because you may roll a sum of 12 on the first roll or you may have to just keep rolling. There is no upper limit on the number of rolls taken since there is no guarantee on when a 12 will be rolled, but $X$ will be an integer value.

**9.4** No, each card that is dealt has a different probability of it being red, since there are fewer cards in the deck after each card is dealt.

**9.5** This is a binomial experiment with our random variable, $X$, denoting the number of seeds that sprout. We have $n = 40$ and $p = 0.80$. Thus,

$$\text{the mean value of } X = np = 40(0.80) = 32$$

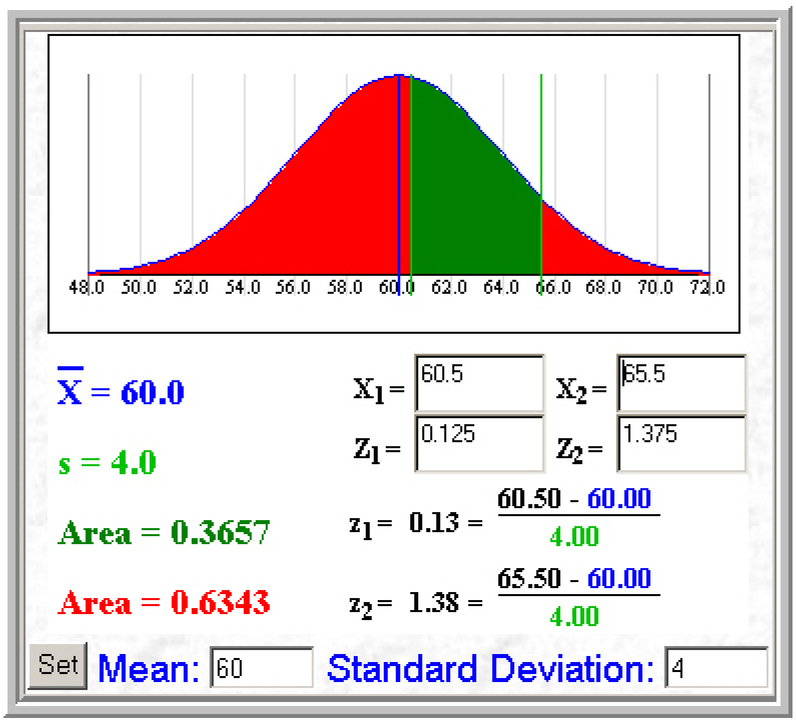
and

$$\text{the standard deviation of } X = \sqrt{npq} = \sqrt{40(0.80)(0.20)} \approx 2.5298$$

**9.6** If $X$ is the binomial random variable for the number of raisins in a bag, we would look for the probability, $P(60 < X < 66)$. In other words, we would find and add the areas of the rectangles at $X = 61, 62, 63, 64, 65$ in the histogram of the binomial distribution. When the normal curve is superimposed over this binomial distribution (histogram), this means our left endpoint will be at 60.5 and our right endpoint will be at 65.5.

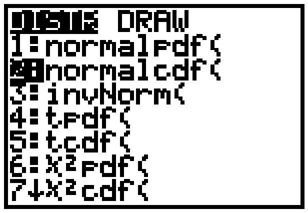
**9.7** Use the information found in the solution to Question 9.6 to find the following normal approximation for the binomial probability, $P(60 < X < 66)$.

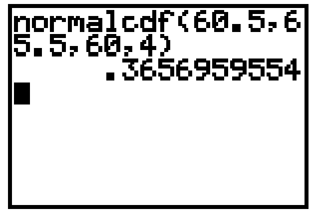
**Applet Method** First, set the mean at 60 and the standard deviation at 4. Then, set $X_1 = 60.5$ and $X_2 = 65.5$.




The green area gives our probability and therefore $P(60.5 \le X \le 65.5) = 0.3657$.

**Calculator Method (TI-83)** Use the calculator instructions given in the solution to Question 9.2.



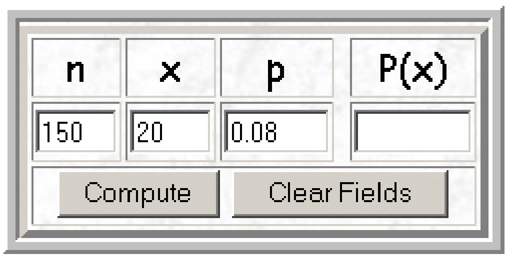


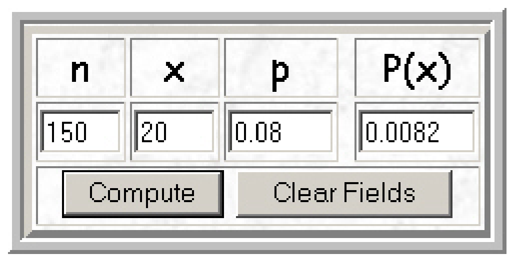

Thus, we have $P(60.5 \le X \le 65.5) \approx 0.3657$.

**9.8** This is a binomial experiment with our random variable, $X$, denoting the number of aces served. We have $n = 150$, $p = 0.08$, and $x = 20$. So,

$$P(X = 20) = C(150,20)(0.08)^{20}(0.92)^{150-20} \approx 0.0082$$

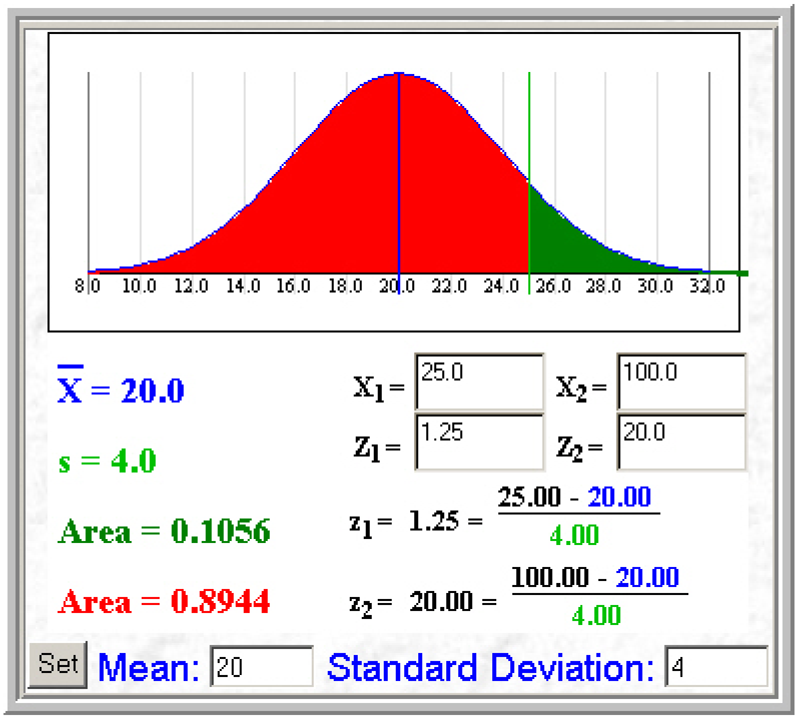
**Binomial Probability Calculator**





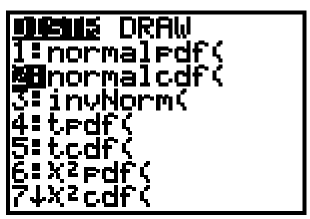

**9.9** We are looking for the probability, $P(X > 25)$.

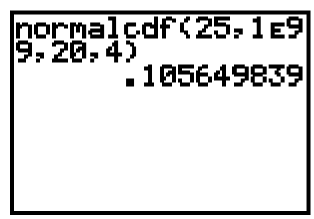
**Applet Method** First, set the mean at 20 and the standard deviation at 4. Then, set $X_1 = 25$ and $X_2 =$ "a big number".




The green area gives our probability and therefore $P(X > 25) = 0.1056$.

**Calculator Method (TI-83)** Use the calculator instructions given in the solution to Question 9.2.




Thus, we have $P(X > 25) \approx 0.1056$.

**9.10** $X$ takes values in the set $\{1,2,\ldots,22\}$ because you may draw a vowel on the first try or you may draw all 21 consonants before you draw a vowel on the 22nd draw.