

28. **TAKS REASONING** Let x be a randomly selected value from a normal distribution with mean 80 and standard deviation 10. If $P(x \leq k) = 0.9192$, what is the value of k ? *Explain.*

29. **ERROR ANALYSIS** In a study, the wheat yields (in bushels) for several plots of land were normally distributed with a mean of 4 bushels and a standard deviation of 0.25 bushel. *Describe* and correct the error in finding the probability that a plot yielded at least 3.8 bushels.

$$z = \frac{x - \bar{x}}{\sigma} = \frac{3.8 - 4}{0.25} = -0.8$$

From the standard normal table, $P(z \geq -0.8) = 0.2119$. So, the probability that a plot yielded at least 3.8 bushels is 0.2119.



30. **CHALLENGE** A normal curve is defined by an equation of this form:

$$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\bar{x}}{\sigma}\right)^2}$$

- Graphing Calculator** Graph three equations of the given form. The equations should use the same mean but different standard deviations.
- Reasoning** *Describe* the effect of the standard deviation on the shape of a normal curve.

PROBLEM SOLVING

EXAMPLES 2 and 3

on pp. 758–759
for Exs. 31–34

31. **BIOLOGY** The illustration shows a housefly at several times its actual size and indicates the fly's wing length. A study found that the wing lengths of houseflies are normally distributed with a mean of about 4.6 millimeters and a standard deviation of about 0.4 millimeter. What is the probability that a randomly selected housefly has a wing length of at least 5 millimeters?



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32. **FIRE DEPARTMENT** The time a fire department takes to arrive at the scene of an emergency is normally distributed with a mean of 6 minutes and a standard deviation of 1 minute.
- What is the probability that the fire department takes at most 8 minutes to arrive at the scene of an emergency?
 - What is the probability that the fire department takes between 4 minutes and 7 minutes to arrive at the scene of an emergency?

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33. **MULTI-STEP PROBLEM** Boxes of cereal are filled by a machine. Tests of the machine's accuracy show that the amount of cereal in each box varies. The weights are normally distributed with a mean of 20 ounces and a standard deviation of 0.25 ounce.
- Find the z -scores for weights of 19.4 ounces and 20.4 ounces.
 - What is the probability that a randomly selected cereal box weighs at most 19.4 ounces?
 - What is the probability that a randomly selected cereal box weighs between 19.4 ounces and 20.4 ounces? *Explain* your reasoning.