14. **Veterinary costs** Costs for standard veterinary services at a local animal hospital follow a Normal model with a mean of $80 and a standard deviation of $20.
   a. Draw and clearly label this model.

![Normal distribution curve]

b. Is it unusual to have a veterinary bill for $125? Explain.
   \[
   \frac{125 - 80}{20} = 2.25 \quad \text{98.78\% of all bills are lower than $125} \quad \text{very unusual}
   \]

   This is over 2.5 \( \sigma \) from mean.

   \text{Cost of Vet Service #125}

   \[
   \text{98.78\% of all bills are lower than $125.}
   \]

   \[
   \text{This is over 2.5 \( \sigma \) from mean, very unusual.}
   \]

c. What is the IQR for the costs of standard veterinary services? Show your work.
   \[
   Q_1 = 25\% \\
   1.475 &= \frac{x - 80}{20} \\
   x &= 66.50
   \]

   \[
   Q_3 = 75\% \\
   1.75 &= \frac{x - 80}{20} \\
   x &= 97.5
   \]

   \[
   \text{IQR} = 97.5 - 66.5 = 31.00
   \]

15. **Soda cans** A machine that fills cans with soda fills according to a Normal model with mean 12.1 ounces and standard deviation 0.05 ounces.
   a. If the cans claim to have 12 ounces of soda each, what percent of cans are under-filled?
      \[
      \frac{12 - 12.1}{0.05} = -2.0 \quad \hat{z} = 0.228 \\
      2.28\% \text{ of cans}
      \]

   b. Management wants to ensure that only 1% of cans are under-filled.
      i. Scenario 1: If the mean fill of the cans remains at 12.1 ounces, what standard deviation does the filling machine need to have to achieve this goal?
         \[
         2.33 = \frac{12 - 12.1}{\text{SD}} \\
         \text{SD} = 0.043 \text{ oz}
         \]

      ii. Scenario 2: If the standard deviation is to remain at 0.05 ounces, what mean does the filling machine need to have to achieve this goal?
         \[
         2.33 = \frac{12 - x}{0.05} \\
         x = 12.12 \text{ oz}
         \]