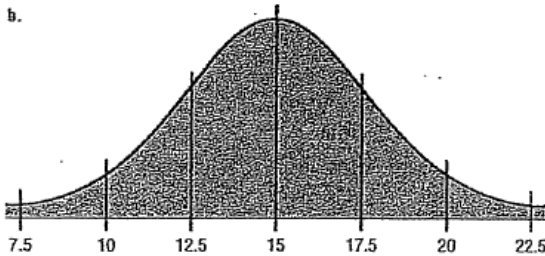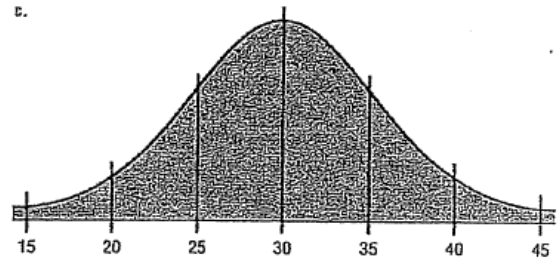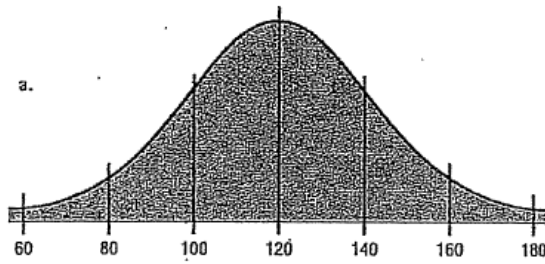1) In the distributions shown, state the mean and standard deviation for each.

a.

c.

b.

Set up the probability statement for each. Show all work.

2. **Teachers' Salaries** The average salary for first-year teachers is $27,989. If the distribution is approximately normal with $\sigma = \$3250$, what is the probability that a randomly selected first-year teacher makes these salaries?

   a. Between $20,000 and $30,000 a year

   b. Less than $20,000 a year

   Source: *N.Y. Times Almanac.*

3. **Population in U.S. Jails** The average daily jail population in the United States is 618,319. If the distribution is normal and the standard deviation is 50,200, find the probability that on a randomly selected day the jail population is

   a. Greater than 700,000.

   b. Between 500,000 and 600,000.

   Source: *N.Y. Times Almanac.*

4. **SAT Scores** The national average SAT score is 1019. If we assume a normal distribution with $\sigma = 90$, what is the 90th percentile score? What is the probability that a randomly selected score exceeds 1200?

   Source: *N.Y. Times Almanac.*

5. **Chocolate Bar Calories** The average number of calories in a 1.5-ounce chocolate bar is 225. Suppose that the distribution of calories is approximately normal with $\sigma = 10$. Find the probability that a randomly selected chocolate bar will have

   a. Between 200 and 220 calories.

   b. Less than 200 calories.

   Source: *The Doctor's Pocket Calorie, Fat, and Carbohydrate Counter.*

6) **CEO Ages** The average age of CEOs is 56 years. Assume the variable is normally distributed. If the standard deviation is 4 years, find the probability that the age of a randomly selected CEO will be in the following range.

   a. Between 53 and 59 years old

   b. Between 58 and 63 years old

   c. Between 50 and 55 years old

Source: Michael D. Shook and Robert L. Shook, *The Book of Odds.*

7) **Race Times** A local medical research association proposes to sponsor a footrace. The average time it takes to run the course is 45.8 minutes with a standard deviation of 3.6 minutes. If the association decides to include only the top 25% of the racers, what should be the cutoff time in the tryout run? Assume the variable is normally distributed. Would a person who runs the course in 40 minutes qualify?

8) **Used Boat Prices** A marine sales dealer finds that the average price of a previously owned boat is $6492. He decides to sell boats that will appeal to the middle 66% of the market in terms of price. Find the maximum and minimum prices of the boats the dealer will sell. The standard deviation is $1025, and the variable is normally distributed. Would a boat priced at $5550 be sold in this store?

9) **Itemized Charitable Contributions** The average charitable contribution itemized per income tax return in Pennsylvania is $792. Suppose that the distribution of contributions is normal with a standard deviation of $103. Find the limits for the middle 50% of contributions.

Source: IRS, *Statistics of Income Bulletin.*

10) **Length of Hospital Stays** The average length of a hospital stay is 5.9 days. If we assume a normal distribution and a standard deviation of 1.7 days, 15% of hospital stays are less than how many days? Twenty-five percent of hospital stays are longer than how many days?

Source: *N.Y. Times Almanac.*

11) **High School Competency Test** A mandatory competency test for high school sophomores has a normal distribution with a mean of 400 and a standard deviation of 100.

   a. The top 3% of students receive $500. What is the minimum score you would need to receive this award?

   b. The bottom 1.5% of students must go to summer school. What is the minimum score you would need to stay out of this group?