1. Battery manufacturers compete on the basis of the amount of time their products last in camera and toys. A manufacturer of alkaline batteries has observed that its batteries last for an average of 26 hours when used in a toy racing car. The amount of time in normally distributed with a standard deviation of 2.5 hours. What is the least amount of time that 34.6% of the batteries will last in a toy racing car?

1. \( \mu = 26 \)  \( \sigma = 2.5 \)  \( x = ? \)

2. \( P(X > c) = .3460 \)

Least means you are looking for a minimum point with every point to the right of the minimum point being equal to 34.6%.

3. 

4. Look in table \( z = .40 \)

5. 

\[ .40 = \frac{(x - 26)}{2.5} \]

\[ 1 = x - 26 \]

\[ x = 27 \]

6. The least amount of time that 34.6% of the batteries will last is 27 hours.
2. The mean annual cost of automobile insurance policies is $939. Assume that the standard deviation is $245. What is the probability that a simple random sample of 50 automobile insurance policies will have a sample mean within $25 of the population mean?

\[ \mu = 939 \quad \sigma = 245 \quad n = 50 \quad \bar{x}_1 = 914 \quad \bar{x}_2 = 964 \]

3. \[ \Pr(914 < \bar{x} < 964) = ? \]

4. \[ \frac{n}{N} \leq .05 \quad \frac{\sigma}{\sqrt{n}} \leq .05 \quad \text{No } N \text{ given so use short formula} \]

\[ \theta = \frac{245}{\sqrt{50}} = 34.6482 \]

5. \[ z_1 = \frac{(914 - 939)}{34.6482} = -0.7215 \approx -0.72 \]

\[ z_2 = \frac{(964 - 939)}{34.6482} = 0.7215 \approx 0.72 \]

6. \[ .2642 + .2642 = .5284 \]

7. There is a 52.84% chance that a sample of 50 automobile insurance policies will have a sample mean within $25 of the population mean.
3. A recent survey was conducted to learn about American adults’ attitudes toward money and happiness. Fifty-six percent of the respondents said they balance their checkbook at least once a month. Suppose a sample of 400 American adults were taken. What is the probability that the sample proportion will be less than 52%?

1) \( \hat{p} = .56 \) \( n = 400 \) \( \bar{p} = .52 \)

2) \( P(\hat{p} < .52) = ? \)

3) ![Diagram showing normal distribution with critical values]

4) \( \frac{n}{N} \leq .05 \quad \frac{400}{N} \leq .05 \quad \text{so use short formula} \)

\[ \theta \bar{p} = \sqrt{\frac{.56 \times (1 - .56)}{400}} = .0248 \]

5) \[ z = \frac{(.52 - .56)}{.0248} = -1.6129 \approx -1.61 \]

6) .0537

7) There is a 5.37% chance that the sample proportion of respondents who balance their checkbook at least once a month will be less than 52%. 