Name	Parameter	Statistic	Quantity Measured
Mean	μ	$\bar{Y}$ or $\bar{y}$	Center or Location
Proportion	ρ	$\hat{p}$ or $\hat{\pi}$	Relative Frequency
Standard Deviation	σ	S or s	Variation or Spread
Variance	σ^2	S^2 or s^2	Variation or Spread

$$\int_{0.04}^{\infty} f(y)dy = 0.176$$

$$P(A) = \int_{0.03}^{0.04} f(y)dy = 0.223$$

$$P(B) = \int_{0.035}^{0.045} f(y)dy = 0.161$$

$$P(A \cap B) = \int_{0.035}^{0.04} f(y)dy = 0.095$$

$$P(A \cup B) = \int_{0.03}^{0.045} f(y)dy = 0.289$$

$$P(A \cup B) = \int_{0.04}^{\infty} f(y)dy + \int_{0.02}^{0.03} f(y)dy = 0.5$$

$$\int_{0}^{0.04} f(y)dy = 1 - \int_{0.04}^{\infty} f(y)dy = 0.824$$

$$\mu$$

$$\bar{Y} = \frac{1}{n}\sum_{i=1}^{n} Y_i$$

$$M = \text{Middle Value}$$

$$y_1 = 25, y_2 = 28, y_3 = 41, y_4 = 34, y_5 = 21, y_6 = 24, y_7 = 25$$

$$\bar{y} = \frac{1}{7}(25 + 28 + 41 + 34 + 21 + 24 + 25) = 28.29 \ years$$

$$21, 24, 25, 25, 28, 34, 41$$

$$21, 24, 25, 25, 27, 28, 34, 41$$

$$26$$

$$\sigma^2 \qquad \sigma \qquad S^2 = \frac{\sum_{i=1}^{n}(Y_i - \bar{Y})^2}{n-1} \qquad S = \sqrt{S^2}$$

$$\bar{y} = 28.29 \ years$$

$$S^2 = \frac{(25 - 28.29)^2 + (28 - 28.29)^2 + ... + (25 - 28.29)^2}{7 - 1} = 47.90 \text{ years}^2$$

$$S = \sqrt{S^2} = 6.92 \text{ years}$$

$$\bar{y} = 28.29$$

$$\hat{p} = \frac{\#\text{ in Category}}{\text{Total }\#} = \frac{Y_1 + Y_2 + ... + Y_{500}}{500}$$

$$\hat{p} = \frac{\#\text{ in Category}}{\text{Total }\#} = \frac{y_1 + y_2 + ... + y_{500}}{500} = 0.860$$

$$\hat{p} = 0.860$$

$$\frac{\hat{p}(1-\hat{p})}{n} \qquad \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$p \text{ or } \pi$$

$$\frac{p(1-p)}{n} \qquad \sqrt{\frac{p(1-p)}{n}}$$

$$y_1 = 0, y_2 = 1, y_3 = 1, y_4 = 1, y_5 = 1, y_6 = 0, y_7 = 1$$

$$\hat{p} = \frac{0+1+1+1+1+0+1}{7} = \frac{5}{7}$$

$$SD(\hat{p}) = \sqrt{\frac{5/7(1-5/7)}{7}} = 0.171$$

$$0 \leq P(A) \leq 1$$

$$\Omega \qquad P(\Omega) = 1 \qquad P(A) = 0.5$$

$$P(A \ or \ B) = P(A \cup B) = P(A) + P(B)$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) \qquad P(A \cap B) = P(A \ and \ B) = 0$$

$$A^c \qquad \bar{A}$$

$$1 = P(\Omega) = P(A \cup A^c) = P(A) + P(A^c) \implies P(A^c) = 1 - P(A)$$

$$\hat{p} = \frac{Y}{20}$$

$$MOE = 2 * s/\sqrt{n}$$

Estimate of mean is 28.29 years ($\pm$5.23 years)

$$n\hat{p} \geq 10, n(1-\hat{p}) \geq 10$$

$$\hat{p} \pm z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$p(x) = P(X = x) = \begin{cases} \frac{12^x e^{-12}}{x!} & x = 0, 1, 2, ... \\ 0 & \text{otherwise} \end{cases}$$

$$X \sim Poi(12)$$

$$P(X < 8) = P(X \leq 7) = \sum_{x=0}^{7} \frac{12^x e^{-12}}{x!} = 0.0895$$

$$P(a < Y < b) = \int_a^b f(y)dy$$

$$f(y) = \begin{cases} 12e^{-12y} & y > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$Y \sim Exp(12)$$

$$P(Y > 0.25) = \int_{0.25}^{\infty} 12e^{-12y}dy = 0.0497$$

$$F(y) = P(Y \leq y)$$

$$P(Y > 0.25) = 1 - P(Y \leq 0.25) = 1 - F(0.25)$$

$$Mean : \mu = \int_{14}^{\infty} yf(y)dy = 26.5$$

$$Median : 0.5 = \int_{14}^{median} f(y)dy \implies Median = 26.08$$

$$P(\hat{p} \leq 0.5) \approx 0.01$$

$$P(Y = 0.25) = \int_{0.25}^{0.25} 12e^{-12y}dy = 0$$

$$MOE = 1.96 * \sqrt{\hat{p}(1-\hat{p})/n}$$

$$\text{Vaccine ex: } 0.860 \pm 0.030 = (0.830, 0.890)$$