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$\bar{x} \pm z^* \left(\frac{\sigma}{\sqrt{n}}\right)$

when $\sigma$ = pop$^2$ sd is known

$\bar{x} \pm t^* \left(\frac{s}{\sqrt{n}}\right)$

$\sigma$ is unknown, sample sd.

$z^* \left(\frac{\sigma}{\sqrt{n}}\right)$ → margin of error.

Formulas

(1) $z = \frac{\bar{x} - \mu}{\sigma}$ or $z = \frac{\bar{x} - \mu}{\sigma_F}$ → $\sigma/\sqrt{n}$

(2) $\bar{x} \pm z^* \left(\frac{\sigma}{\sqrt{n}}\right)$ or $\bar{x} \pm t^* \left(\frac{s}{\sqrt{n}}\right)$ for CI.

(3) Probability "formulas" / methods.

(4) $\sigma = \sqrt{\sigma^2}$ → std dev → SQRT of variance

(5) Expected value, $E(X) = \text{sum}(x \cdot P(x))$.

$P(A) = \frac{\#\text{ of ways A happens}}{\text{total \# of possibilities}}$

(6) Outlier is more than 1.5(IQR) from mean.

① $\sigma = 30$

margin error = 9

$$z^* \frac{\sigma}{\sqrt{n}} = 9$$

$$1.645 \cdot \frac{30}{\sqrt{n}} = 9$$

$$n = 30.0669$$

2. $\bar{x} = 31000$ df: 35

$s = 4500$

$n = 36$

b) $t_{\alpha/2} \frac{s}{\sqrt{n}} = 2.042 \frac{4500}{\sqrt{36}} = 1531.5$

a) $\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$

$31000 \pm 1531.5$

$(29,468.5, 32531.5)$

c) $\frac{1531.5}{2} = 765.75 = t^* \frac{4500}{\sqrt{n}}$

$n = 144$

3.

null hypothesis

$H_0$ : $\mu = 30000$ , always about a population parameter.

$H_a$ : $\mu < 30,000$

alternate hypothesis.

4.

$H_0$ : $\mu = 240$.

$H_a$ : $\mu > 240$ . (mean temp).

5. $H_0$: $\mu = 1/2$

$H_a$ : $\mu \neq 1/2$

6. $H_0$ : $\mu =$ sticker claim

$H_a$ : $\mu <$ sticker claim