Example 8.2 Confidence Interval Estimates

OpenStax
Introductory Statistics 2e

$$\overline{X} - Z_{\alpha} \left(\frac{\sigma}{\sqrt{n}} \right) \leq \mu \leq \overline{X} + Z_{\alpha} \left(\frac{\sigma}{\sqrt{n}} \right)$$
 $\overline{X} = 68$, $\sigma = 3$, $n = 36$, $Z_{0.05}$ from calculator

Suppose scores on exams in statistics are normally distributed with an unknown population mean and a population standard deviation of three points. A random sample of 36 scores is taken and gives a sample mean of 68. Find a confidence interval estimate for the population mean exam score.

NORMAL FLOAT AUTO REAL RADIAN MP

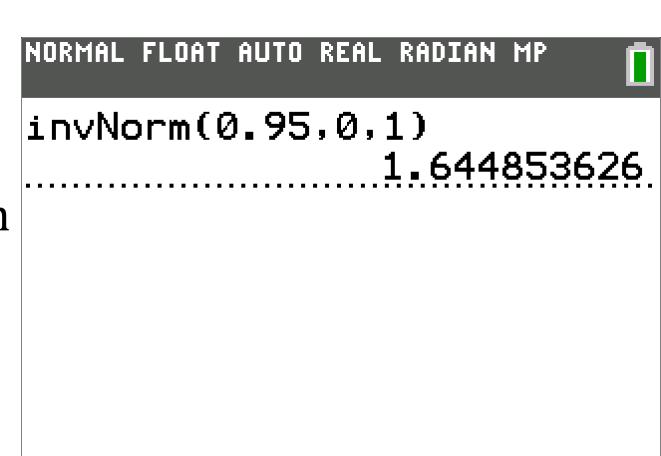
invNorm

area:0.95

μ:0

 $\sigma:1$

Paste



$$\overline{X} - \overline{Z}_{\alpha} \left(\frac{\sigma}{\sqrt{n}} \right) \leq \mu \leq \overline{X} + \overline{Z}_{\alpha} \left(\frac{\sigma}{\sqrt{n}} \right)$$

$$\overline{X} = 68, \ \sigma = 3, \ n = 36, \ \overline{Z}_{0.05} \ \text{from calculator}$$

$$68 - 1.645 \left(\frac{3}{\sqrt{36}} \right) \leq \mu \leq 68 + 1.645 \left(\frac{3}{\sqrt{36}} \right)$$

$$\overline{X} - \overline{Z}_{\alpha} \left(\frac{\sigma}{4\pi^{2}} \right) \leq \mu \leq \overline{X} + \overline{Z}_{\alpha} \left(\frac{\sigma}{\sqrt{n^{2}}} \right)$$
 $\overline{X} = 68$, $\sigma = 3$, $n = 36$, $\overline{Z}_{0.05}$ from calculator

 $68 - 1.645 \left(\frac{3}{\sqrt{36}} \right) \leq \mu \leq 68 + 1.645 \left(\frac{3}{\sqrt{36}} \right)$
 $68 - 0.822 \leq \mu \leq 68 + 0.822$

$$X - Z_{\alpha} \left(\frac{\sigma}{\sqrt{n}} \right) \leq \mu \leq X + Z_{\alpha} \left(\frac{\sigma}{\sqrt{n}} \right)$$
 $X = 68$, $\sigma = 3$, $n = 36$, $Z_{0.05}$ from calculator

 $68 - 1.645 \left(\frac{3}{\sqrt{36}} \right) \leq \mu \leq 68 + 1.645 \left(\frac{3}{\sqrt{36}} \right)$
 $68 - 0.822 \leq \mu \leq 68 + 0.822$
 $67.178 \leq \mu \leq 68.822$

NORMAL FLOAT AUTO R	EAL RADIAN MP
invNorm(0.95,0,1)	
004 [06	1.644853626
Ans*3/\36	.822426813
68-Ans	
68+.822426813	67.17757319
68+.822426813	68.82242681