

## Stats: Critical Regions For A Sampling Distribution Hypothesis Test

*How to find critical regions for a sampling distribution hypothesis test.*

We may need a calculator's Inverse Normal function.

Casio fx-991EX Classwiz	Casio fx-CG 50
1) Press MENU then 7:Distribution	1) Press MENU then 1 then OPTN
2) Press 3: Inverse Normal	2) Press F5 for STAT
3) Set the Area* and the correct $\sigma$ and $\mu$	3) Press F3 for DIST and again for NORM
4) Press = and round to 3sf	4) Press F3 for InvN
	5) Input Area*, SD, and mean in that order
* Area must be to the left of your point	6) Press EXE and round to 3sf

**E1:** Ngoneh is conducting a sampling distribution hypothesis test using  $X \sim N(40, 4)$ . Find the critical region if  $H_1: \mu > 40$  and the significance level is 5%.

### Method If Calculator Is Allowed

### Working

1) Find the area required:

0.95

2) Use a calculator as above:

$x > 43.3$  to 3sf

### Method If Solutions Relying On Calculator Tech Are Not Allowed

### Working

1) Find the z-value in the Percentage Points of the Normal distribution table:

1.6449

2) Use the z-equation to find an x-value and give your critical region:

$$1.6449 = \frac{x - 40}{2}$$

$$3.2898 = x - 40$$

$$x > 43.3 \text{ to 3sf}$$

## Questions

1) A sampling distribution hypothesis test is set up for  $X \sim N(80, 25)$ . Find the critical region if  $H_1: \mu > 80$  and the significance level is 5%.

2) A sampling distribution hypothesis test is set up for  $X \sim N(100, 8^2)$ . Find the critical region if  $H_1: \mu < 100$  and the significance level is 1%.

3) A sampling distribution hypothesis test is set up for  $X \sim N(64, 5)$ . Find the critical region if  $H_1: \mu \neq 64$  and the significance level is 5%.

4) A Normally distributed variable has mean 125 and variance 36. A sample of 10 is taken to test that the mean has decreased. Find the critical region for a test at significance 1%.

5) A Normally distributed variable has mean 90 and variance 40. A sample of 20 is taken to test that the mean has changed. Find the critical region for a test at significance 10%.

6) A Normally distributed variable has mean 50 and standard deviation 8. A sample of 15 is taken to test that the mean has increased. Find the critical region for a test at significance 5%.

## Answers

1)  $x > 88.2$   
4)  $x < 120.6$

2)  $x < 81.4$   
5)  $x < 87.7 \cup x > 92.3$

3)  $x < 59.6 \cup x > 68.4$   
6)  $x > 53.4$