TOPIC: INTRODUCTION TO CONFIDENCE INTERVALS

Introduction to Confidence Intervals

◆ We can estimate parameters with a _____ **point estimate**, *or* a _____ of values, aka a **confidence interval**.

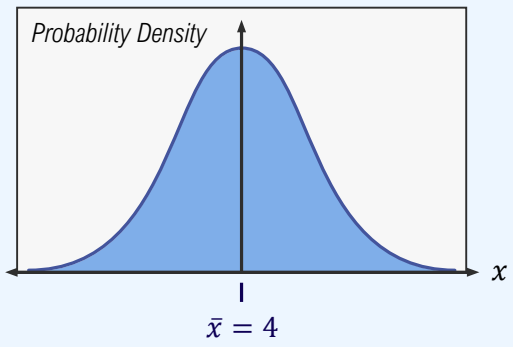
► **Confidence Level**: _____ that the confidence interval contains the parameter. Notation: _____

► **Margin of Error**: Distance between point estimate & _____ of interval.

EXAMPLE

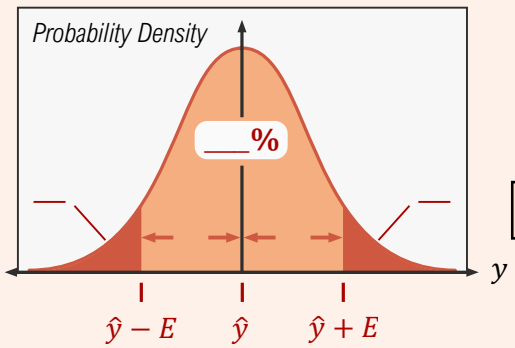
$(\boldsymbol{A})$ Find α for a 95% confidence interval. $(\boldsymbol{B})$ Make a 95% confidence interval for a parameter, y, with point estimate $\hat{y} = 4$, & margin of error $E = 2$

Recall **Point Estimate**



Interpretation: μ_x is most likely 4

New **Confidence Interval**



$\alpha = 1 - C$

$(\hat{y} \quad E < y < \hat{y} \quad E)$

Interpretation: We are _____ confident that y is between _____ & _____.

◆ Other notation: (_____ , _____) or _____.

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PRACTICE Find α for a 90% confidence interval.

PRACTICE Make a 90% confidence interval for a parameter, y, with point estimate $\hat{y} = -1.5$, & margin of error $E = 3.25$.

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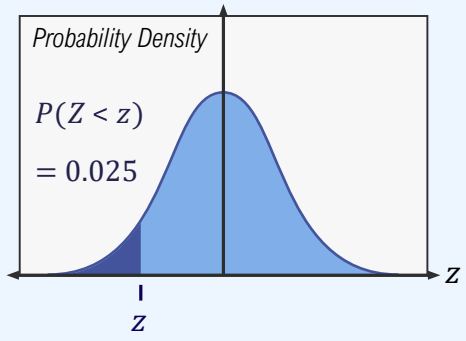
Critical Values: z-Scores

◆ To calculate margin of error, you'll often need a **critical value** $z_{\alpha/2}$, which is just a z–score.

► Recall: The TOTAL area in the two tails of a confidence interval is **Recall** $\alpha = 1 - C$

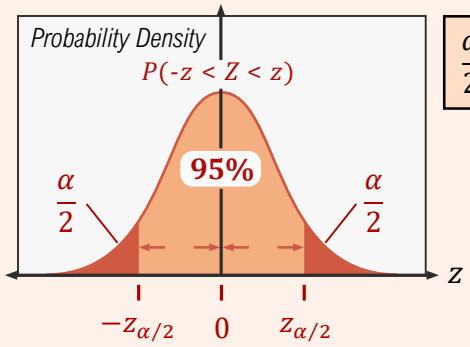
EXAMPLE Find the critical value, $z_{\alpha/2}$, for a 95% confidence interval.

Recall z **–Score**



$$0.025 = P(Z < z)$$
$$z = -1.96$$

New **Critical** z **–Score**



$$\frac{\alpha}{2} = P(Z > z_{\alpha/2}) = P(Z < -z_{\alpha/2})$$

*Use a calculator to find $z_{\alpha/2}$ or look it up in z–table.

◆ $z_{\alpha/2}$ will *always* be the same for a particular confidence level.

Confidence Level (C)	$\frac{\alpha}{2} = \frac{1 - \text{conf. lev.}}{2}$	$z_C = z_{\alpha/2}$
90%		
95%	$\frac{1 - 0.95}{2} = 0.025$	1.960
99%		

PRACTICE Find the critical value, $z_{\alpha/2}$, for an 80% confidence interval.