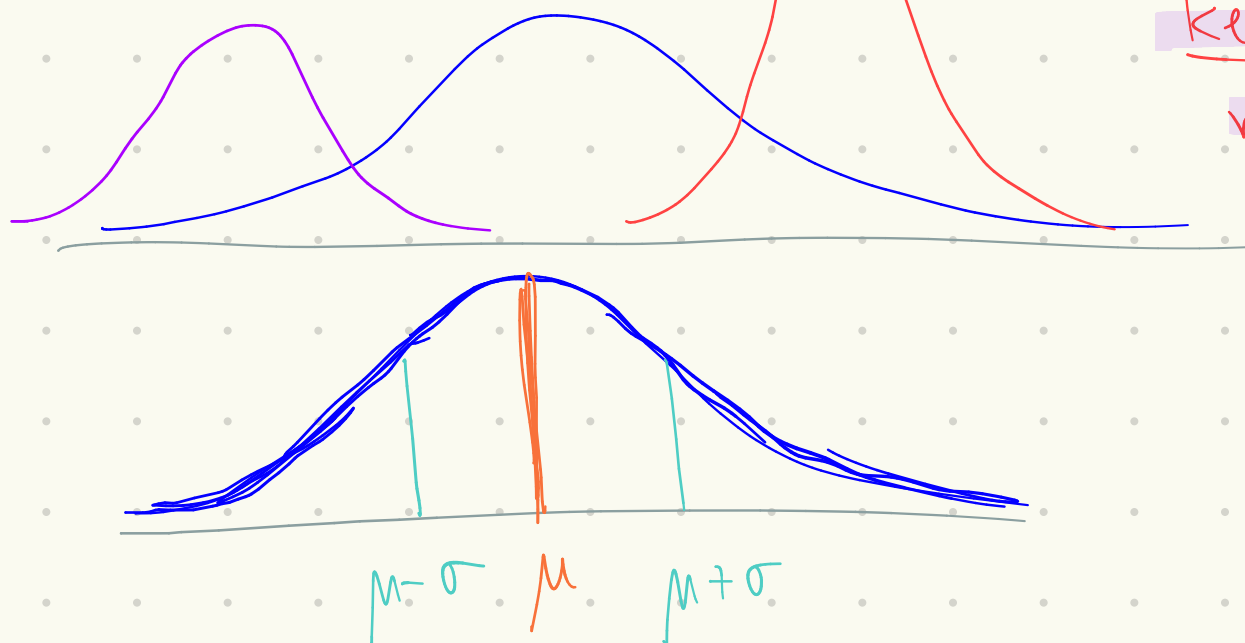# Chapter 7 Review

def $X$ a **continuous** random variable (RV).
$X$ is **normally distributed** if the distribution looks like a bell-curve



**key** lots of normal curves depend on **mean** $\mu$ & **standard deviation** $\sigma$

$\mu - \sigma \quad \mu \quad \mu + \sigma$

## Key Properties

① bell-shaped / symmetric

$*$ ② $\boxed{\text{AREA} = \text{PROBABILITY}}$

③ Mean = median = mode

## Notation

$\boxed{\text{CALC}}$ $2^{nd}$ + VARS $\longrightarrow$ #2. normalcdf(

EE
$\downarrow$
$-\infty = -1 \text{E} 99$
$+\infty = 1 \text{E} 99$

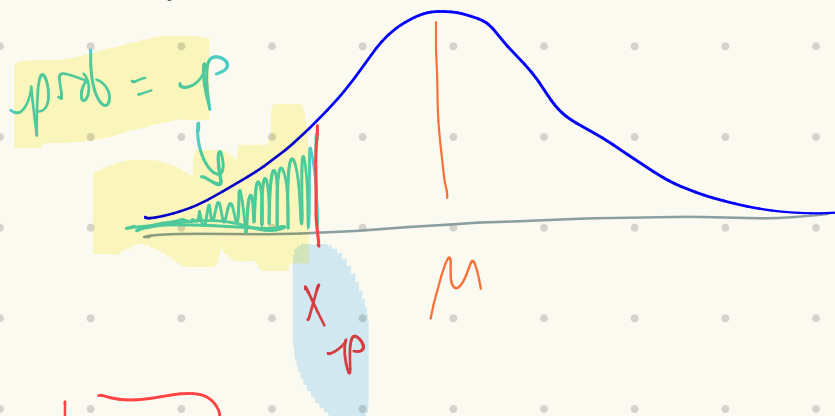$$P(a < x < b) = \text{normalcdf}(a, b, \mu, \sigma)$$

= probability of selecting ONE person/item from $X$ having values between a and b.

= proportion of people/items from $X$ that have values between a and b.



$a \quad \mu \quad b$
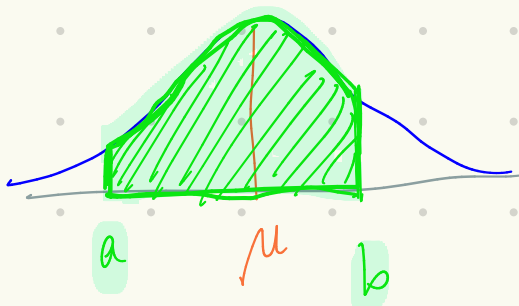
# Inverse Normal

Given a probability, we want to know the value of $x$ w/ $z$.

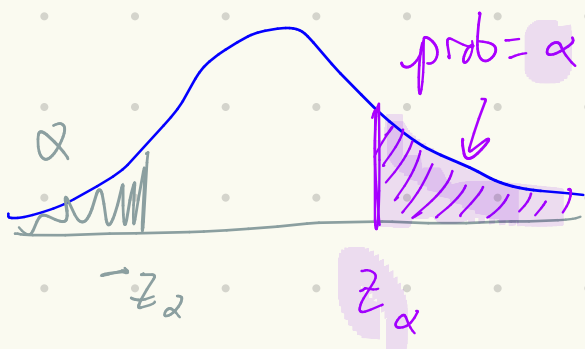prob $= p$

$X_p$

$\mu$

Given $p$, $\boxed{x_p}$ = value on x-axis that separates
probability $\underline{(p)}$ on the left tail

$$x_p = \text{inv Norm}( p, \mu, \sigma, \text{TAIL} )$$

Note older TI's don't have tail $\longrightarrow$ use LEFT

ASSUMING STANDARD NORMAL ($\mu = 0, \sigma = 1$)

Critical Value $z_\alpha$ = z-score that separates
probability $\alpha$ on the RIGHT Tail

prob $= \alpha$

$$z_\alpha = \text{inv Norm}( \alpha, 0, 1, \text{RIGHT})$$

= older

$$\text{inv Norm}( 1-\alpha, 0; 1 )$$

$\alpha$

$-z_\alpha$        $z_\alpha$

$$z-\text{dist} = \text{standard normal dist}$$
$$\mu = 0 \ \& \ \sigma = 1$$

# Ch 8 Review

## Sampling Distributions :

the distribution of **ALL** samples of size $n$ of a RV $X$

## Sampling Dist of MEAN

Given a RV $X$ w/
  ① mean $\mu$ & st. dev. $\sigma$
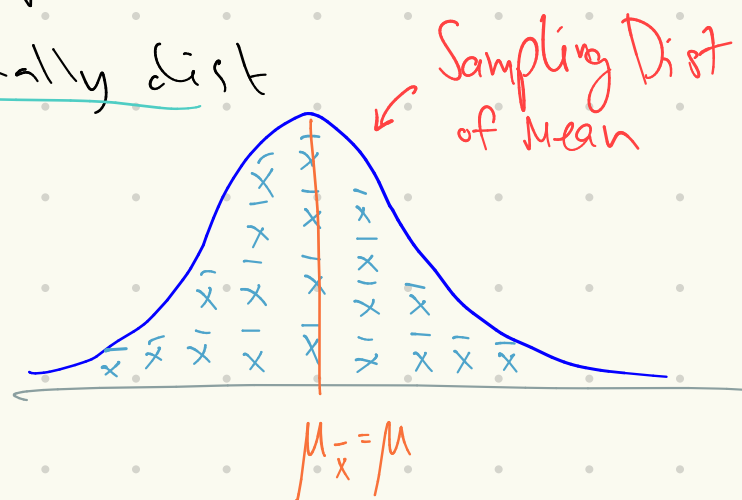  ② SRS & indep sample size $n$

### Conclusions

  ① distribution of all sample means $\bar{x}$
     are (approx.) normally dist
     as $n$ increases

(CLT)

  ②
  $$\mu_{\bar{x}} =$$
  $$\sigma_{\bar{x}} =$$

Sampling Dist of Mean

$\mu_{\bar{x}} = \mu$

### How to use

Step 0  Are you selecting $n$ people/items w/ $n > 1$?

Step 1  Is $X$ normally dist OR $n > 30$?

Step 2  Find $\mu_{\bar{x}}$ & $\sigma_{\bar{x}}$

Step 3  Use *normalcdf* w/ $\mu_{\bar{x}}$ & $\sigma_{\bar{x}}$.

# Sampling Dist of Proportion

Given a RV $X$ that has
 ① population proportion $p$.
 ② SRS & indep. sample size $n$
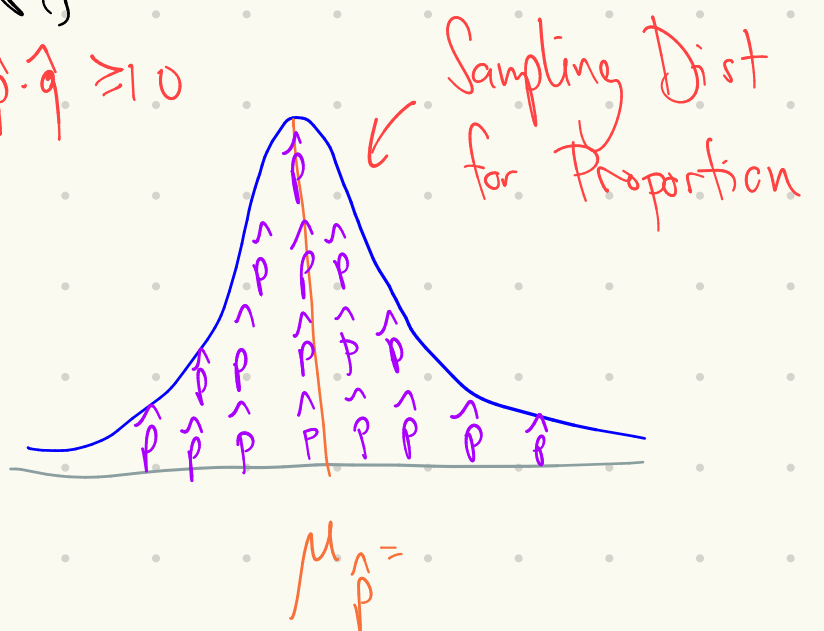
**Conclusions** (CLT)

① shape of distribution of all samples $\hat{p}$ are (approx.) normally distributed as $n$ increases

provided that $n \cdot \hat{p} \cdot \hat{q} \geq 10$

② $$\mu_{\hat{p}} =$$

$$\sigma_{\hat{p}} =$$

Sampling Dist for Proportion

$\mu_{\hat{p}} =$

**How to use**

Step 0  Are you selecting $n$ people/items w/ $n > 1$?

Step 1  Is $X$ normally dist OR $n > 30$?

Step 2  Find $\mu_{\bar{x}}$ & $\sigma_{\bar{x}}$

Step 3  Use *normalcdf* w/ $\mu_{\bar{x}}$ & $\sigma_{\bar{x}}$.