Topics 13a & 15 vs Topic 21a & b

One Population

$\mu = ?\ \sigma = 7.6$

↓ Sample

$n = 35\quad \bar{x} = 11.9\quad s_x = 8.2$

Looking at population mean μ

Two Populations

Pop 1: $\mu_1 = ?\ \sigma_1 = 7.6$

↓ Sample One

$n_1 = 28\quad \bar{X}_1 = 26.2$
$s_1 = 6.3$

Pop 2: $\mu_2 = ?\ \sigma_2 = 7.4$

↓ Sample Two

$n_2 = 33\quad \bar{X}_2 = 25.6$
$S_2 = 5.9$

Looking at the difference in the population means $\mu_1 - \mu_2$

Best point estimate

One population: $\bar{X}$

Two populations: $\bar{X}_1 - \bar{X}_2$

Distributions of the point estimates

One population:

$$N\left(\mu, \frac{\sigma}{\sqrt{n}}\right)$$

Two populations:

$$N\left(\mu_1 - \mu_2, \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}\right)$$

Confidence Interval

One population:

$$\bar{X}_1 \pm Z_{\frac{\alpha}{2}}\left(\frac{\sigma}{\sqrt{n}}\right)$$

Two populations:

$$\left(\bar{X}_1 - \bar{X}_2\right) \pm Z_{\frac{\alpha}{2}}\left(\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}\right)$$

for a 90% C.I.
want 5% below, 5% above
qnorm(.05, lower.tail = FALSE)
gives $Z = 1.645$

One population:

$$11.9 \pm 1.645\left(\frac{7.6}{\sqrt{35}}\right)$$

(9.7868, 14.013)

Two populations:

$$(26.2 - 25.6) \pm 1.645\sqrt{\frac{7.6^2}{28} + \frac{7.4^2}{33}}$$

$$0.6 \pm 1.645 * 1.93$$

(−2.575, 3.775)