Lecture 8 HW - KEY

1. $\mu = 5850$ $\sigma = 1125$

Conditions:

- Independence - reasonable ✓
- 10% Condition - more than 90 4 yr colleges ✓
- Randomization - random selection ✓
- Large Enough - population normally distributed ✓

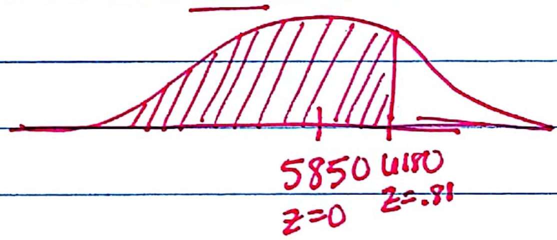
CONDITIONS MET

a. $n = 9$

$\mu_{\bar{x}} = \underline{5850}$ $\sigma_{\bar{x}} = \frac{1125}{\sqrt{9}} = \underline{375}$

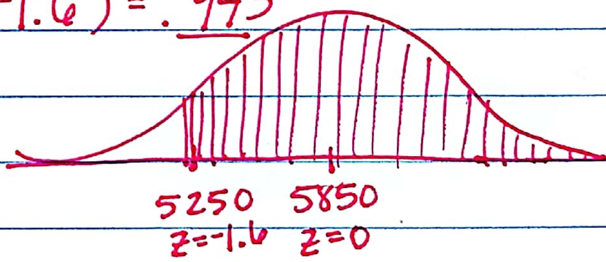
b. $P(\bar{x} < 6180) = P(z < .88) = \underline{.811}$

$z = \frac{6180 - 5850}{375} = .88$



c. $P(\bar{x} > 5250) = P(z > -1.6) = \underline{.945}$

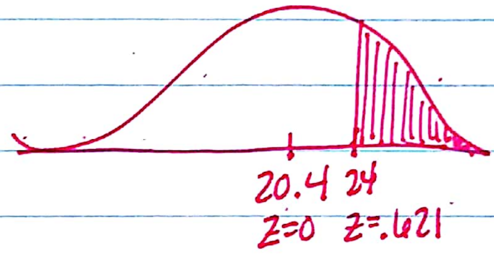
$z = \frac{5250 - 5850}{375} = -1.6$



2. Population $\sim N(20.4, 5.8)$

a) $P(X > 24) = P(z > .621) = .267$

$$z = \frac{24-20.4}{5.8} = .621$$



b) $n=30$

$\mu_{\bar{x}} = \underline{20.4}$ $\sigma_{\bar{x}} = \frac{5.8}{\sqrt{30}} = \underline{1.059}$

c) $P(\bar{X} > 24) = P(z > 3.399) = \underline{.0003}$

$n=30$

Conditions:

Randomization - randomly chosen ✓

Independence - reasonable ✓

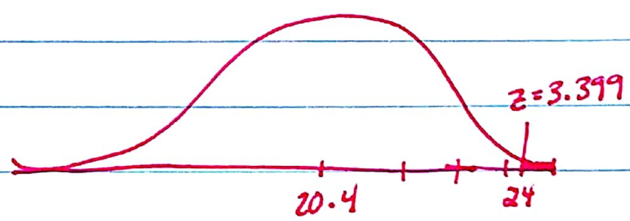
10% Condition - more than 300 student ACT takers ✓

Nearly Normal - population is normal ✓

CONDITIONS MET

$\sim N(20.4, 1.059)$

$$z = \frac{24-20.4}{1.059} = 3.399$$



3. $\mu = 31,460$ $\quad n = 36$ $\quad df = 35$

$\bar{x} = 31,800$ $\quad s = 915$

1 sample t-test for means

$H_0: \mu = 31460$

$H_a: \mu > 31460$

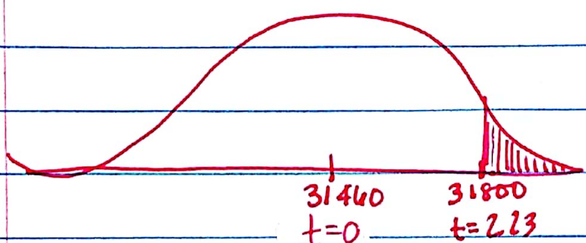
μ is the true population mean of first-year salaries for acturial science graduates in the Denver/Boulder region

Conditions:

- Independence - reasonable ✓
- Randomization - random sample ✓
- Nearly Normal - $n > 30$, CLT ✓
- 10% Condition - reasonable to assume there are more than 360 acturial science graduates in the Denver/Boulder region ✓

$\mu_{\bar{x}} = 31,460$ $\quad \sigma_{\bar{x}} = \frac{915}{\sqrt{36}} = 152.5$

$t = \frac{31800 - 31460}{152.5} = 2.23$ $\quad$ p-value: $\underline{.016}$



Because p is .016, which is less than $\alpha = .05$, we reject Ho. There is evidence that the true population mean of first-year salaries for acturial science graduates in the D/B region is greater than 31 460.

4. $\mu = 500$ $n = 75$ $df = 74$
$\sigma = 100$ $\bar{x} = 515$

1 sample t-test for means
Ho: $\mu = 500$
Ha: $\mu > 500$
μ is the true population mean of college entrance exam scores for all graduates of said principal's high school

Conditions:
- Independence - reasonable ✓
- Randomization - random sample ✓
- Nearly Normal - $n > 30$, CLT ✓
- 10% Condition - Unclear. The number of students at her high school may be more/less than 750. ?

CONDITIONS MET ??

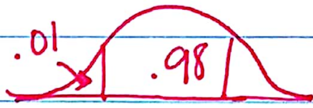
$\mu_{\bar{x}} = 500$ $\sigma_{\bar{x}} = \frac{100}{\sqrt{75}} = 11.547$

$t = \frac{515 - 500}{\frac{100}{\sqrt{75}}} = 1.299$ p-value: .099

Because p is .099, which is greater than $\alpha = .05$, we fail to reject Ho. There is NOT evidence that the true population mean of college entrance exam scores for graduates of this HS is higher than 500.

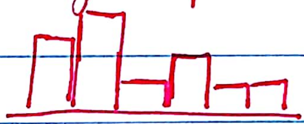
5. $n = 10$ $\qquad$ $df = 9$ $\qquad$ C Level: 98%

$\bar{x} = 261.5$ $\qquad$ $s = 138.89$



1 sample t-interval for means

Conditions:

- Independence - reasonable
- Randomization - random sample ✓
- 10% Condition - large corporation, so
- Nearly Normal -  x skewed

CONDITIONS NOT MET

↳ You can proceed with caution + construct your CI, but should be wary of the result

$\bar{x} \pm t^* \left(\frac{s}{\sqrt{n}}\right)$

$261.5 \pm 2.82 \left(\frac{138.89}{\sqrt{10}}\right)$

261.5 ± 123.857

$(137.643, 385.357)$

Based on our sample, we are 98% confident that the true population mean of employee family dental expenses (employed at the large corporation) lies between \$137.64 and \$385.36.