Probability & Statistics

Post Class Problems Assigned 2/26 due 3/2
Sec 4.3 #1,3,5
Sec 4.4 #5,7

4.3 1) $H_0: \mu = 110$, $H_a: \mu > 110$, $n = 16$, $\bar{x} = 113.5$, $\sigma^2 = 100$

$$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}} = \frac{113.5 - 110}{10/\sqrt{16}}$$

$z = 1.4$

a) $z_{.05} = 1.645 > 1.4$ → Fail to reject H_0 at 5% sig level
b) $z_{.10} = 1.282 < 1.4$ → Reject H_0 at 10% sig level

4.3 3) $H_0: \mu = 25$, $H_1: \mu < 25$, $\sigma^2 = 9$
C: $\bar{X} \leq 22.5$ for $n = 4$

a) $\bar{X} \leq 22.5$

$$\frac{22.5 - \mu}{\sigma/\sqrt{n}} \leq z_\alpha$$

$$\frac{22.5 - 25}{3/\sqrt{4}} \leq z_\alpha$$

$$-1.67 \leq z_\alpha$$

$\alpha = 0.0475$

b) $\bar{X} = 24.1125 > 22.5$
Fail to reject H_0 because $\bar{X}$ is not in critical region

4.3 5) $X: (\mu, 0.09)$, $H_0: \mu = 1.5$, $H_1: \mu > 1.5$

$P(\bar{X} \geq C; \mu = 1.5) = 0.05$
$P(Z \geq 1.645) = 0.05$
$P(\bar{X} \geq \mu + 1.645 \frac{\sigma}{\sqrt{n}}) = 0.05$
$C = 1.5 + 1.645 \cdot \frac{.3}{\sqrt{n}}$

$P(\bar{X} \geq C; \mu = 1.7) = 0.95$
$P(Z \leq -1.645) = 0.95$
$P(\bar{X} \leq \mu - 1.645 \frac{\sigma}{\sqrt{n}}) = 0.95$
$C = 1.7 - 1.645 \cdot \frac{.3}{\sqrt{n}}$

$1.5 + 1.645 \cdot .3/\sqrt{n} = 1.7 - 1.645 \cdot .3/\sqrt{n}$
$3.29 \cdot .3/\sqrt{n} = 0.2$
$n = 24.35 = 25$
$C = 1.6$