Hw 9
22S:39 2009
Solutions



**7-10**

a) $P(\bar{X} < 10) = P\left(Z < \frac{10-8.2}{0.2143}\right) = P(Z < 8.4) \approx 1.0$

b) $P(5 < \bar{X} < 10) = P(-14.932 < Z < 8.4) \approx 1.0$

c) $P(\bar{X} < 6) = P(Z < -10.27) \approx 0$

**7-11**

$$\bar{X}_1 - \bar{X}_2 \sim N\Big(\underbrace{75-70}_{5}, \underbrace{\frac{8^2}{16} + \frac{12^2}{9}}_{20}\Big) \quad \text{or} \quad N(5, 20)$$

a) $P(\bar{X}_1 - \bar{X}_2 > 4) = P(Z > -0.2236) = 0.5885$

b) $P(3.5 \le \bar{X}_1 - \bar{X}_2 \le 5.5) = P(-0.3354 < Z < 0.1118)$
$= 0.5445 - 0.3687 = 0.1759$

**7-13** Assuming we have normal distributions

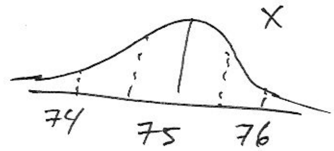
$$\bar{X}_{high} - \bar{X}_{low} \sim N(5, 2)$$

$$P(\bar{X}_h - \bar{X}_l \ge 2) = P(Z \ge -2.12) = 0.983$$

**9A-1** $n = 40$ parent pop'n has mean 75 and $\sigma^2 = 10$

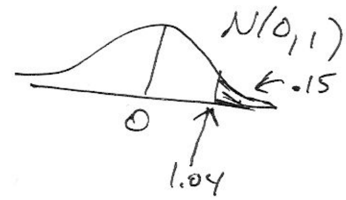
$\bar{X} \sim N(75, 10/40)$

because $n \geq 30$




$P(\bar{X} \leq ?) = 0.85$

Relate to the standard normal...




$P(Z \leq \underline{1.04}) = 0.85$

So, we want the value 1.04 std. dev. up from the mean of $\bar{X}$.

$? = 75 + 1.04\left(\sqrt{10/40}\right)$
$= 75.52$

**9A-2** $\hat{\theta}_2$ is best. It's 'best' because it has the smaller variance, and the two estimators were on equal ground with respect to bias (both were unbiased). $\hat{\theta}_2$ also has the smaller MSE.