

Keys to Version A of Midterm Test 2 in MA 180/418, Fall 2010

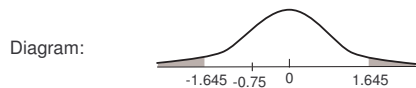
Q1: **c** Q2: **b** Q3: **a** Q4: **b** Q5: **d**

- Q6: (a) The formula is $E = z_{\alpha/2} \frac{\sigma}{\sqrt{n}} = 2.575 \times \frac{6}{\sqrt{12}} = 4.46$.
 Also, the center of the interval is $\bar{x} = 131.25$, by calculator.
 The interval is 131.25 ± 4.46 , or $126.79 < \mu < 135.71$
 If you use calculator, the function is **ZInterval**.
 (b) $\bar{x} = 131.25$.
 (c) $E = 4.46$. If you used **ZInterval**, then $E = (135.71 - 126.79)/2$.
 [Bonus] $128.40 < \mu < 134.10$. This is shorter, because the confidence level is lower.

- Q7: (a) $n = \frac{(z_{\alpha/2})^2 \cdot 0.25}{E^2} = \frac{2.33^2 \cdot 0.25}{0.02^2} = 3393.06$, round up to 3394
 (b) $n = \frac{(z_{\alpha/2})^2 \hat{p}\hat{q}}{E^2} = \frac{2.33^2 \cdot 0.84 \cdot 0.16}{0.02^2} = 1824.11$, round up to 1825

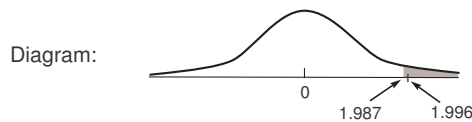
- Q8: (a) $s = 0.04$
 (b) $0.033 < \sigma < 0.052$ by using the formula $\sqrt{\frac{17 \times 0.04^2}{24.769}} < \sigma < \sqrt{\frac{17 \times 0.04^2}{10.085}}$
 Chi-square (χ^2) distribution, $n - 1 = 17$ degrees of freedom.

- Q9: (a) $H_0: p = 0.2$, $H_1: p \neq 0.2$; (b) test statistic: $z = \frac{0.185 - 0.2}{\sqrt{0.2 \times 0.8 / 400}} = -0.75$



- (c) critical values: ± 1.645 ; we accept H_0 . We accept the original claim.
 (d) P-value is $2 \times 0.2266 = 0.4532$ (by Table A-2)
 or 0.4533 (by calculator function **1-PropZTest**);
 we accept H_0 because P-value $> \alpha = 0.1$.

- Q10: (a) $H_0: \mu = 5.2$, $H_1: \mu > 5.2$; (b) test statistic: $t = \frac{5.313 - 5.2}{0.54 / \sqrt{91}} = 1.996$



- (c) critical value: 1.987; we accept H_1 . We accept the original claim.
 (d) P-value is $0.01 < P < 0.025$ (by Table A-3)
 or 0.0245 (by calculator function **T-Test**);
 we accept H_1 because P-value $< \alpha = 0.025$.