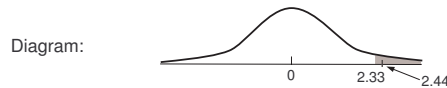


Keys to Version A of Midterm Test 3 in MA 180/418, Fall 2010

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

Q6: (a) $H_0: p_1 = p_2$, $H_1: p_1 > p_2$; (b) $\bar{p} = 0.2146$;



- (c) test statistic: $Z = 2.44$; (d) critical value: 2.33;
 (e) we accept H_1 . We accept the original claim.
 (f) P-value is 0.0073 (by Table A-2) or 0.0074 (by calculator function **2-PropZTest**); we accept H_1 because P-value $< \alpha = 0.01$.

Q7: (a) $(\bar{x}_1 - \bar{x}_2) - E < (\mu_1 - \mu_2) < (\bar{x}_1 - \bar{x}_2) + E$
 (b) $E = t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$, (df = smaller of $n_1 - 1$, $n_2 - 1$)
 (c) (11.95, 30.05) by Table A-3, or
 (12.07, 29.93) by calculator function **2-SampTInt**;

Q8: (a) $\bar{d} - E < \mu_d < \bar{d} + E$
 (b) $E = t_{\alpha/2} \frac{s_d}{\sqrt{n}}$, (df = $n - 1$)
 (c) (-11.49, -2.91) by Table A-3, or
 (-11.48, -2.92) by calculator function **TInterval**;

Q9: (a) $r = 0.959$ by calculator function **LinRegTTest**;
 (b) The critical value is 0.878. There is a linear correlation.
 (c) $\hat{y} = -46.78 + 1.51x$ by calculator function **LinRegTTest**;

Q10: (a) the predicted y -value is $-46.78 + 1.51 \cdot 100 = 104.2$
 (we use the regression equation, because there is a linear correlation)
 (b) $r^2 = 0.9206$ by calculator function **LinRegTTest**
 (c) $s_e = 3.4050$ by calculator function **LinRegTTest**
 [Bonus] Total variation: $(n - 1)s_y^2 = (5 - 1) \cdot (10.464)^2 = 438.0$
 [Bonus] explained variation: $438.0 \cdot 0.9206 = 403.2$
 [Bonus] unexplained variation: $(n - 2)s_e^2 = (5 - 2) \cdot (3.4050)^2 = 34.8$