STAT 100 SUMMER II 2001 (PROFESSOR GREEN) SOLUTIONS TO ASSIGNED PROBLEMS DUE AUGUST 14

Problem 58. We have $z_{.01} = 2.33$. In each case, $\hat{p} = \frac{x}{n}$ so that $1 - \hat{p} = \frac{n-x}{n}$, and the desired error margin has the form $\sqrt{\frac{\frac{x}{n}\frac{n-x}{n}}{n}} \times 2.33 = \sqrt{\frac{x(n-x)}{n^3}} \times 2.33$.

(a) .1636
(b) .04
(c) .0186

Problem 60. The point estimate is $\frac{49}{78} = .628$. The estimated standard error is (as in problem 58) $\sqrt{\frac{49\times 29}{78^3}} = .055$. $\alpha = 4.6$ and $z_{2.3} = 2$. This gives an error margin of .109.

Problem 64. Computing as in Problem 58, we have $z_{.025} = 1.96$, $n = 325$, and $x = 120$. This gives an error margin of .053. The point estimate is $\frac{120}{325} = .369$. The desired confidence interval is therefore $(.316, .422)$.

Problem 68. In each part of this problem $n = 750$

(a) $\hat{p} = .598$, the estimated standard error is $\sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = .0179$, $z_{.025} = 1.96$, so the error margin is .035, and the desired 95% confidence interval is $(.564, .633)$.
(b) This time $\hat{p} = .042$ so the E.S.E. is .0073. $z_{.05} = 1.645$ so the error margin is .012, giving a 90% confidence interval of $(.030, .054)$.

Problem 74.

(b) $H_0 : p = .75$
$H_1 : p > .75$
$Z = \frac{\hat{p} - .75}{.0287}$
$R : Z \geq 2.05$
(c) $H_0 : p = .60$
$H_1 : p \neq .60$
$Z = \frac{\hat{p} - .60}{.0558}$
$R : |Z| \geq 2.33$

(d) $H_0 : p = .56$
$H_1 : p < .56$
$Z = \frac{\hat{p}-.56}{.0535}$
$R : Z < -1.28$

Problem 78. The null hypothesis is $p = .5$; the alternative hypothesis is $p < .5$. For a random sample of 500 voters, the test statistic, as in problem 74, is $Z = \frac{\hat{p}-.5}{.0224}$. The actual sample gives $\hat{p} = \frac{228}{500} = .456$; $z = -1.96$ for a P-value of .025. At a significance level of .05, this justifies rejecting the null hypothesis.

Problem 84. In this case, the null hypothesis is $p = .75$, the alternative hypothesis is $p > .75$, and with $n = 980$, the test statistic is given by $Z = \frac{\hat{p}-.75}{.0138}$ The actual data give $z = \frac{.03}{.0138} = 2.17$, with a P-value of .015, or 1.5%. This is a low P-value, which gives substantial support to the conjecture.