

**STAT 100 SUMMER II 2001 (PROFESSOR GREEN)**  
**SOLUTIONS TO ASSIGNED PROBLEMS DUE**  
**AUGUST 8**

Problem 2. The point estimate in each case is  $\bar{x}$ .

- (a)  $\frac{\alpha}{2} = .0125$ ;  $z_{\frac{\alpha}{2}} = 2.24$ ;  $d = \frac{5.96}{\sqrt{120}} \times 2.24 = 1.22$   
(b)  $\frac{\alpha}{2} = .06$ ;  $z_{\frac{\alpha}{2}} = 1.555$ ;  $d = \frac{87}{\sqrt{240}} \times 1.555 = 8.73$   
(c)  $\frac{\alpha}{2} = .05$ ;  $z_{\frac{\alpha}{2}} = 1.645$ ;  $d = \frac{.095}{\sqrt{1200}} \times 1.645 = .0045$

Problem 4.  $\frac{\alpha}{2} = .023$ ;  $z_{\frac{\alpha}{2}} = 2$ .

- (a)  $s = \sqrt{\frac{235}{69}} = 1.85$ ;  $d = \frac{s}{\sqrt{70}} \times 2 = .4412$   
(b)  $s = \sqrt{\frac{546}{89}} = 2.48$ ;  $d = \frac{s}{\sqrt{90}} \times 2 = .522$   
(c)  $s = \sqrt{\frac{745}{159}} = 2.16$ ;  $d = \frac{s}{\sqrt{160}} \times 2 = .342$

Problem 6. The point estimate is the same as the sample mean or 3.8 minutes. We have  $s = 1.2$ ,  $n = 40$ ,  $\frac{\alpha}{2} = .05$ , and  $z_{\frac{\alpha}{2}} = 1.645$ . This gives  $d = .312$  minutes.

Problem 10. Here  $s = 4.7$ ,  $\frac{\alpha}{2} = .005$ , and  $z_{\frac{\alpha}{2}} = 2.58$ . We want  $\frac{4.7}{\sqrt{n}} \times 2.58$  to be at most 1.8, and as close to that value as we can get for a whole number  $n$ . We achieve this by setting them equal and solving for  $n$ , and then taking the next whole number. This gives  $n = (\frac{4.7}{1.8} \times 2.58)^2 = 45.3827$  so that the desired sample size is 46.

Problem 14. From the 90% error margin of 2.7 with  $n = 108$ , we solve for  $\sigma$ . Specifically, we have  $\frac{\alpha}{2} = .05$ ;  $z_{\frac{\alpha}{2}} = 1.645$  and  $\frac{\sigma}{\sqrt{108}} \times 1.645 = 2.7$ , so that  $\sigma = \frac{2.7 \times \sqrt{108}}{1.645} = 17.06$ .

Now we can consider the 95% confidence interval. We now have  $\frac{\alpha}{2} = .025$ ;  $z_{\frac{\alpha}{2}} = 1.96$ , and  $\frac{\sigma}{\sqrt{n}} \times 1.96 = 1.8$ , so that  $n = (\frac{17.06 \times 1.96}{1.8})^2 = 344.974$  and the appropriate sample size is 345.