Pledge:

11/7/2006 MATH171 – Statistical Decision Making Name:____________
Dr. Lunsford Quiz 8 20 Points Total

Please show <u>all work and calculator input for full credit</u>.

I. Suppose you want to compute a 93% confidence interval for a population mean using a z-interval. What value of z^* will you use to compute the margin of error? (4 points)

II. The College Board reports that high school students who retake the SAT mathematics exam and who are not coached have an average increase in score of 22 points with a standard deviation of 50 points. You work for a large SAT coaching agency that wants to compare the average increase of their students who retake the SAT mathematics exam to those students who are not coached. Assume that the standard deviation of your students' score increases is the same as students who have not been coached. Please answer the following:

(a) You would like compute a 95% confidence interval for the average increase in SAT mathematics score of students who use your coaching service. How many students who have used your service will you need to sample so that the margin of error for the confidence interval is no more than 10 points? (4 points)

(b) Suppose you randomly select 200 students who have used your coaching service and find that their average increase on the SAT mathematics exam is 26 points. Find a 95% confidence interval for the average increase in SAT mathematics score for all students who have used your coaching service. Be sure to show all calculator input! (5 points)

(c) Write a complete English sentence explaining the meaning of the confidence interval found in part (b) above. (4 points)

(d) Based on the confidence interval computed above, do you think you have sufficient justification to claim that the coaching service for the SAT mathematics exam offered by your agency is worth the expensive price? Why or why not? (3 points)

Formulas and results you may or may not need:

x - count, $\hat{p} = \frac{x}{n}$, $x \sim binomial(\mu = np, \sigma = \sqrt{np(1-p)})$

$x \approx normal(\mu_x = np, \sigma_x = \sqrt{np(1-p)})$ $\hat{p} \approx normal(\mu_{\hat{p}} = p, \sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}})$

$\bar{x} \approx normal(\mu_{\bar{x}} = \mu, \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}})$ for n large enough and *is* normal if the population variable is normal.

c-level confidence interval for μ is $\bar{x} \pm m$ where $m = z^* \frac{\sigma}{\sqrt{n}}$.

$$n = \left(\frac{z^* \sigma}{m} \right)^2$$