

Name \_\_\_\_\_

Table # \_\_\_\_\_

You may use your two crib sheets (in your hand only), a calculator, and the tables I supply. Use no other outside source of information. **Show your work.**

1. A random sample of 9 recently sold houses in Atlantis resulted in a sample average sale price of \$122,000 and a sample standard deviation of  $s = \$12,000$ . Assuming the sales prices of houses follow a normal distribution, give a 90% confidence interval for the true mean selling price of homes in Atlantis.

2. The following observations were made on fracture toughness of base plate of 18% nickel maraging steel. 69.5 73.5 83.7 76.1  
Give a 95% confidence interval for the standard deviation of the fracture toughness distribution. Is the interval valid whatever the nature of the distribution? Explain.

3. A sample of 50 cotton swabs resulted in a sample average percent elongation of 7.17 and a sample standard deviation of 1.32. Give a 95% confidence interval for the true mean percent elongation  $\mu$ .

4. A study was conducted of the compressive strengths of concrete specimens made with pulverized fuel-ash mix. A random sample of 60 specimens were aged 7 days resulting in an observed average compressive strength of  $\bar{x} = 27.29 \text{ N/mm}^2$  and a sample standard deviation of  $s_x = 4.12$ . A random sample of 74 specimens were aged 28 days and an average compressive strength of  $\bar{y} = 36.26$  was observed with a sample standard deviation of  $s_y = 5.93$ . Give a 95% confidence interval for the difference  $\mu_x - \mu_y$  in the true mean compressive strengths.

5. a)  $t_{4,0.05} =$   
c)  $z_{0.05} =$   
e)  $t^2_{12,0.975} =$

b)  $t^2_{12,0.025} =$   
d)  $t_{4,0.95} =$   
f)  $t_{,0.0516} =$

6. A certain piece of equipment is known to have a lifetime  $T$  which can be regarded as a Weibull random variable with  $P[ T > t ] = e^{-t^2/1000}$ , for  $t \geq 0$ . You sell one-year warranties for the equipment and charge \$25, so that if the equipment fails in the first year you pay the \$10,000 replacement cost, and if it lasts a year or more you pay nothing.

(a) The amount  $Y$  that you make on a sale is a random variable taking two values. Give the probability mass function of  $Y$ .

(b) What is the probability you lose money on a single sale?

(c) What is the expected amount you make on a sale?

(d) If you sell 100 warranties, what is the probability you lose money ?

(e) Approximately how many warranties would you need to sell to make the probability of making a total of \$1000 at least .9?