Please noted that I did not have enough time to prepare these practice problems so I only can give you the abbreviated answers. However, this does not mean that you can give me the abbreviated answers in your exam! Enjoy it!

- The results of an annual Claimant Satisfaction Survey of policyholders who have had a claim with State Farm Insurance Company revealed a 90% satisfaction rate for claim service. To check the accuracy of this claim, a random sample of 177 State Farm claimants was asked to rate whether they were satisfied with the quality of the service, in which 86.44% samples were satisfied with the quality. Can we infer that the satisfaction rate is less than 90% by using 5% significance level?

Your results should look like this

$H_0: p \geq .90$

$H_1: p < .90$

$$z = \frac{\hat{p} - p}{\sqrt{p(1-p)/n}} = \frac{.8644 - .90}{\sqrt{.90(1-.90)/177}} = -1.58,$$

Non-Reject the null hypothesis

- A survey of 400 statistics professors was undertaken. Each professor was asked how much time was devoted to teaching graphical techniques. The sample mean was 252.38. We believe that the times are normally distributed with a population standard deviation of 30 minutes. Estimate the population mean with 95% confidence.

Your results should look like this

10.30 $\bar{x} \pm z_{\alpha/2}\sigma/\sqrt{n}$ = 252.38 $\pm$ 1.96(30/$\sqrt{400}$) = 252.38 $\pm$ 2.94; LCL = 249.44, UCL = 255.32

- A professor computed the variance of the marks on his final exam and found population variance was 250. He recently made changes to the way in which the final exam is marked and wonder whether this would result in a reduction in the variance. A random sample of this year's final exam marks are listed below. Can the professor infer at the 10% significance level that the variance has decreased?

57	92	99	73	62	64	75	70	88	60

$H_0 : \sigma^2 \geq 250$

$H_1 : \sigma^2 < 250$

Rejection region: $\chi^2 < \chi^2_{1-\alpha,n-1} = \chi^2_{.90,9} = 4.17$

$$\chi^2 = \frac{(n-1)s^2}{\sigma^2} = \frac{(10-1)(210.22)}{250} = 7.57,$$

Non-Reject the null hypothesis

- A manufacturer of lightbulbs advertises that, on average, its long-life bulb will last more than 5,000 hours. To test the claim, a statistician took a random sample of 100 bulbs and measured the amount of time until each bulb burned out. The sample mean was 5065. If we assume that the lifetime of this type of bulb has a population standard deviation of 400 hours, can we conclude at the 5% significance level that the claim is true?

$H_0 : \mu \leq 5{,}000$

$H_1 : \mu > 5{,}000$

$$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}} = \frac{5{,}065 - 5{,}000}{400 / \sqrt{100}} = 1.62$$

Non-Reject the null hypothesis

- A courier service advertises that its average delivery time is less than 6 hours for local deliveries. A random sample of times for 12 deliveries to an address across town was recorded. These data are shown here. The sample mean was 569 with sample standard deviation of 1.58. Is this sufficient evidence to support the courier's advertisement, at the 5% level of significance?

Your results should look like this

$H_0 : \mu \geq 6$

$H_0 : \mu < 6$

a Rejection region: $t < -t_{\alpha, n-1} = -t_{.05, 11} = -1.796$

$$t = \frac{\bar{x} - \mu}{s / \sqrt{n}} = \frac{5.69 - 6}{1.58 / \sqrt{12}} = -.68,$$

Non-Rejection the null hypothesis

- How much money do winners go home with from the television quiz show Jeopardy? To determine an answer, a random sample of 15 winners was drawn; the recorded amount of money each won is listed here. The sample mean was 24.501 with sample standard deviation of 17,386. Estimate with 95% confidence the mean winnings for all the show's players.

Your results should look like this

$\bar{x} \pm t_{\alpha/2} s/\sqrt{n}$ = 24,051 $\pm$ 2.145(17,386/$\sqrt{15}$) = 24,051 $\pm$ 9,628; LCL = 14,422, UCL = 33,680

- X is normally distributed with mean 100 and standard deviation 20. What is the probability that X is greater than 145?

P(X > 145) = $P\left(\frac{X-\mu}{\sigma} > \frac{145-100}{20}\right)$ = P(Z > 2.25) = 1 – P(Z < 2.25) = 1 – .9878 = .0122

- The calls made by employees of a company are normally distributed with a mean of 6.3 minutes and a population standard deviation of 2.2 minutes. Find the probability that a call.
  (a) Lasts between 5 and 10 mins
  (b) Lasts more than 7 mins
  (c) Lasts less than 4 minutes

a P(5 < X < 10) = $P\left(\frac{5-6.3}{2.2} < \frac{X-\mu}{\sigma} < \frac{10-6.3}{2.2}\right)$ = P(–.59 < Z > 1.68)

= P(Z < 1.68) – P(Z < –.59) = .9535 – .2776 = .6759

b P(X > 7) = $P\left(\frac{X-\mu}{\sigma} > \frac{7-6.3}{2.2}\right)$ = P(Z > .32) = 1 – P(Z < .32) = 1 – .6255 = .3745

c P(X < 4) = $P\left(\frac{X-\mu}{\sigma} < \frac{4-6.3}{2.2}\right)$ = P(Z < –1.05) = .1469

- The marks on a statistics midterm test are normally distributed with a mean of 78 and a population standard deviation of 6. What is the probability of the class has a midterm mark of less than 75? What is the probability that a class of 50 has an average midterm mark that is less than 76?

a $P(X < 75) = P\left(\frac{X-\mu}{\sigma} < \frac{75-78}{6}\right)$ = P(Z < –.50) = .3085

b $P(\overline{X} < 75) = P\left(\frac{\overline{X}-\mu}{\sigma/\sqrt{n}} < \frac{76-78}{6/\sqrt{50}}\right)$ = P(Z < –2.35) = 0.0094

- The manager of a restaurant in a commercial building has determined that the proportion of customers who drink tea is 14%. What is the probability that in the next 100 customers at least 10% will be tea drinkers?

$P(\hat{P} > .10) = P\left(\frac{\hat{P}-p}{\sqrt{p(1-p)/n}} > \frac{.10-.14}{\sqrt{(.14)(1-.14)/100}}\right)$ = P(Z > –1.15) = 1 – P(Z < – 1.15)

= 1 – .1251 = .8749