MA113-Fall01 Test #3 Name: Key

Show your work! Circle your final answer.

1. (12%)
The following observations was drawn from a normal population whose variance is 100:

12 8 22 15 30 6 39 48

Construct a 90% confidence interval estimate for the population mean. What assumption(s) must be made?

3 $\bar{X} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$

2 $22.5 \pm 1.645 \frac{10}{\sqrt{8}}$ it's (-2)

2 22.5 ± 5.8

2 $16.7 \le \mu \le 28.3$

If t-procedure used then (-3) if use t but right

$s = 15.25$

$\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}}$ (-6)

$22.5 \pm .895 \cdot \frac{15.25}{\sqrt{8}}$

22.5 ± 10.2

$12.3 \le \mu \le 32.7$

3 We are 90% confident that the population mean lies between 16.7 and 28.3

2. (12%)
A scientist estimate the mean nitrogen dioxide level in West London is greater than 28 parts per billion. You want to test this estimate. To do so, you determine the nitrogen dioxide levels for 36 randomly selected days.

4 a. State the null hypothesis in symbols and words. and alternative

(2) H_0 $\mu \le 28$ The mean nitrogen dioxide level in West London is less or equal than 28 parts per billion

(2) H_a: $\mu > 28$ The mean = is greater than 28 parts per billion

4 b. Describe in words Type I and Type II error in terms of this application.

(2) Type I error: Conclude that the mean is greater than 28 parts per billion (reject H_0 | H_0 true) while in fact it is less or equal to 28 parts per billion

(2) Type II error: Conclude that the mean is less or equal to 28 parts per billion while in fact it is greater than 28 parts per billion

4 c. Define the level of significance. (H_0 true | false)

level of significance $= \alpha = P[\text{Type I error}]$ (2)