

**Assignment #4 (5%)**  
**(Due date: Monday, November 30<sup>th</sup>, 2020)**

- *This assignment can be done manually using the statistic tables, formulas, and calculator. Work must be shown for marks to be given. Round the confidence interval limits to 2 decimal places.*
  - *This is an individual assignment. You can discuss with your friends but you have to write up the assignment on your own. Please submit your assignment solution through the Blackboard-Course Message or my Humber email: [tan.le@humber.ca](mailto:tan.le@humber.ca)*
1. A statistics professor is in the process of investigating how many classes postsecondary students miss each semester. To help answer this question, he took a random sample of **64** Humber College students and asked each to report the number of classes he/she had missed in the previous semester. The average number of classes missed is  $\bar{x} = 10$  classes. Assume that the population standard deviation of classes missed  $\sigma$  is **4** classes. Construct a **98% confidence interval** for the population mean number of classes missed by all students at Humber. (Hint: Using the Z-distribution)  

(5 marks)
  2. A policing researcher would like to estimate a population mean  $\mu$  to **within 5 units**. The **confidence level** has been set at **95%** and the population standard deviation  $\sigma$  is **12**. Determine the **sample size n**. (Hint: Using the Z-distribution)  

(3 marks)
  3. Domestic violence in the United States is a serious problem. Once arrested, offenders are very likely to re-offend. Domestic violence counseling programs define success when an offender completes a counseling program and goes six or more months (180 days) without re-offending. Construct a **98% confidence interval** number of days to re-offend for men who repeat domestic violence: **17 17 14 31 33 35 45 65 20 58** (Hint: Using the t-distribution)  
(Note: Sample size  $n = 10$ ,  $\bar{x} = 33.50$  days and  $s = 17.77$  days.)  

(5 marks)
  4. The average length of stay of inmates at a provincial correctional facility is believed to be at least 23 months. To test this belief, a sample of **25** inmates were randomly selected at the facility. Their mean length of stay was found to be  $\bar{x} = 20$  months with a standard deviation of  $S = 6.5$  months. Is there enough evidence (at significance level  $\alpha = 1\% = 0.01$ ) to conclude that inmates spend **less than** an average of **23 months** at the facility? (Hint: Using the student t-distribution)  

(7 marks)

## Formulas & Notations

### Confidence Interval:

$\sigma$ known	$\sigma$ unknown
$\bar{X} \pm Z \frac{\sigma}{\sqrt{n}}$	$\bar{X} \pm t \frac{s}{\sqrt{n}}$
OR	
$LCL = \bar{X} - Z \frac{\sigma}{\sqrt{n}}$ $UCL = \bar{X} + Z \frac{\sigma}{\sqrt{n}}$	$LCL = \bar{X} - t \frac{s}{\sqrt{n}}$ $UCL = \bar{X} + t \frac{s}{\sqrt{n}}$
<b>Sample Size:</b> $\text{Round up } n = \left( \frac{Z \times \sigma}{E} \right)^2$	

### Hypothesis Testing:

$H_0: \mu = \mu_0$ $H_1: \mu \neq \mu_0$	$H_0: \mu \leq \mu_0$ $H_1: \mu > \mu_0$	$H_0: \mu \geq \mu_0$ $H_1: \mu < \mu_0$
$Z = \frac{\bar{X} - \mu}{\sigma / \sqrt{n}}$		$t = \frac{\bar{X} - \mu}{s / \sqrt{n}}$