Carleton University
School of Mathematics and Statistics
STAT 2509 A - Assignment #1

DUE: May 15th, 2025 (to be submitted on BrightSpace before 10:00am)

Review of STAT 2507

1. Choose a right answer:

a) A numerical measure for a population is referred to as
(i) a population (ii) a parameter (iii) a statistic (iv) a sample

b) A numerical measure for a sample is referred to as
(i) a population (ii) a parameter (iii) a statistic (iv) a sample

2. Which of the following are measures of Central tendency?

a) mean & standard deviation b) mean & median c) mean & range

3. The process of using information from a sample to draw conclusions about the entire population is called

(i) sampling, (ii) the scientific method, (iii) statistical inference, (iv) descriptive statistics

4. a) Define following : (i) parameter, (ii) statistic

b) Classify each of the following quantities as either a '*parameter'* or a '*statistic'*:

(i) σ^2 (ii) μ (iii) $\hat{\beta}_1$ (iv) s^2 (v) β_0 (vi) $\bar{x}$

5. Identify the following variables as : "*purely categorical (or qualitative)"*, "*categorical and ranked"*, "*quantitative and discrete"* or "*quantitative and continuous"*.

a) Mercury concentration in a sample of tuna
b) Fast-food establishment preferred by a student (McDonald, Burger King, A&W)
c) Score (0 – 100) on a placement examination
d) Taste ranking (excellent, good, fair, poor)
e) Colour of rose bush
f) The number of defective lightbulbs in a package of 4 bulbs
g) Dress size: 3, 5, 7, 9, 11, 13, 15, 17

6. a) Define two-sided and one-sided hypotheses about a parameter μ and give the steps involved in their testing.

b) For any hypothesis test, what are the two types of errors that may be made? Explain.

7. Find the following values from the tables:

a) $z_{0.025}$ b) $z_{0.975}$ c) $z_{0.05}$ d) $t_{0.10;4}$ e) $-t_{0.10;4}$ f) $t_{0.90;4}$

8. If *k* is a constant and *X* and *Y* are random variables, then

a) (i) E(*k*)=?, (ii) E(*kX*)=?, (iii) E($X \pm Y$)=?
b) (i) V(*k*)=?, (ii) V(*kX*)=?, (iii) V($X \pm Y$)=? Also show what happens when *X* and *Y* are independent of each other?

9. Consider a normal population distribution with the value of σ known.

a) What value of z in the confidence interval formula

$$\left(\bar{x} - z_{\alpha/2}\,\sigma/\sqrt{n}, \bar{x} + z_{\alpha/2}\,\sigma/\sqrt{n}\right)$$

results in a confidence level of

(i) 89.68% (ii) 99.20% (iii) 75.40%

b) Would a 90% C.I. be narrower or wider than the 99.20% C.I. in a)? Why? How would we make 99.20% C.I. of the same width as the 90% C.I.?