**STAT500 HW#7 Solutions**

1. *(20pts; each 5pts)*
2. 95% T Confidence Intervals

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| Variable N Mean StDev SE Mean 95% CI  Speed 20 9.10000 2.57314 0.57537 (7.89573, 10.30427) |

1. The normal probability plot for reading speed suggests no reason to believe that the data aren’t normally distributed since the points all fall within the confidence limits.

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1. We are 95% confident, under repeated sampling, that the mean reading speed of all fourth-graders at the school is between 7.896 and 10.304 minutes.
2. We are now 98% confident that the average reading speed is between 7.639 and 10.561 minutes for all fourth-graders at the school. The interval has widened with 98% confidence as compared to 95% (we have lost precision by demanding greater confidence for the interval).

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| Variable N Mean StDev SE Mean **98% CI**  Speed 20 9.10000 2.57314 0.57537 **(7.63885, 10.56115)** |

**2) (***10pts)*

**, , ,** =2.093, and the formula for CI is .

Therefore, we have the CI given as (7.895, 10.304).

**3) (***15pts; each 5pts)*

* 1. From n ≥ 30 and based on Central Limit Theorem for the sample mean (),will be normally distributed and will have mean μ with standard deviation. Socan be used as a point estimate for µ. The point estimate of the mean time required to handle a customer complaint would be 28.7 minutes.
  2. The standard deviation of the point estimate given in (a) would be

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* 1. To find the 95% confidence interval, using the Student’s t-distribution method to determine the 95% C.I. for t.025 with 37 degrees of freedom (df = *n* – 1 = 38 – 1 = 37) because we’re estimating μ from a normal population.

From Minitab, t_alpha2 = *t*0.025 = 2.026

⇒ CI: ± t.025 (*s* /√*n*) = 28.7 ± (2.026) (0.616) = (27.452, 29.948)

The confidence interval for 95% is (27.45, 29.95). There are 95% sure that the mean time required to handle a customer complaint will be between 27.45 and 29.95 minutes

**4)** *(10pts)*

**b)** T

**c)** F

**d)** F

**e)** T.

**5)** *(15 pts; each 5 pts)*

The sample size is small n=16 (less than 30), so we must use normal probability plot to check if this sample may come from a normal distribution.

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1. The 95% t confidence intervals are used here because the data is normal distributed. According to Minitab output, there is a 95% chance that the mean length of time required for all third-grade students to read the material is between 21.88 and 26.49.

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| Variable N Mean StDev SE Mean 95.0 % CI  Reading 16 **24.19** 4.32 1.08 **(21.88, 26.49)** |

1. All third grade students in this particular large school district.
2. We can be 95% certain that the average length of time for all third-grade students to read a specified amount of material is between 21.88 and 26.49 minutes.

**6)** *(15 pts)*

Using Crude Method: E = 80, σ ≈ (1600 – 400)/4 = 300;

α = 0.08, zα/2 = z0.04 =1.75069 (from Minitab)

⇒ n = (zα/2 × σ / E)2 = (1.75069 x 300 / 80) 2 =43.1, round up to 44.

Sample size needed is 44

**7)** *(15 pts)*

Using Crude Method again: E = 80, σ ≈ (1600 – 400)/4 = 300;

α = 0.02, zα/2 = z0.01 = 2.32635 (from Minitab)

⇒ n = (zα/2 × σ / E)2 = (2.32635 x 300 / 80) 2 = 76.1049, round up to 77

Sample size needed is 77.