

Math 254 Assignment Three

Name: _____

Due: In class on Thursday September 8

Assignments must be completed on this paper. Marks may be deducted for not showing all your work.

1. [4 marks] We are testing $H_0 : \mu = 115$ versus $H_a : \mu \neq 115$ at significance level $\alpha = 0.05$ with a sample of size 64. We are given $\sigma = 10$. What is the probability of not rejecting H_0 if the true value of μ is 113.5?

2. [8 marks] Times for the 100 m freestyle swim are recorded for two swimmers on 12 different days. Both swimmers' times are normally distributed for this event. Test with $\alpha = 0.05$ whether Swimmer 1 is faster than Swimmer 2.

Swimmer 1: 59.21 59.84 59.36 60.04 60.11 59.57

Swimmer 2: 59.77 59.52 60.21 60.36 60.05 60.00

a) State H_0 and H_a

b) What are the assumptions?

c) Do you reject H_0 or not? Show all your work.

d) What can you say about the p -value of the test?

3. [7 marks] An experimenter weighs a single object and gets the readings below (in kg). The readings for this object are normally distributed. Test at $\alpha = 0.05$ whether the scale has variance $\sigma^2 = 0.005 \text{ kg}^2$.

1.115 1.284 1.281 1.348

a) State H_0 and H_a

b) What are the assumptions?

c) Do you reject H_0 or not? Show all your work.

d) What can you say about the p -value of the test?

4. [6 marks] A national survey states that 67% of college students are under the age of 25, 21% are between 25 and 30, 8% are between 30 and 40, and 4% are over 40. A random sample of Camosun College students yielded the data below. Test at $\alpha = 0.05$ whether the age distribution at Camosun agrees with the national survey.

Age	< 25	25 – 30	30 – 40	> 40
Frequency	138	62	32	18

a) State H_0 and H_a

b) Do you reject H_0 or not? Show all your work.