MTH 245, Quiz #9, Spring 2023          Name _____ KEY _____

**Instructions:** Show all work. Answers without work can only be graded all or nothing. Partial credit is available only when work is shown. Answer all parts of each problem. Provide explanations as indicated. You may use Excel to complete any required statistical calculations or graphs. Submit any Excel work with assignment. Do not say "see Excel" for answers, but write or paste them into this document. Exact answers are preferred unless specifically asked to round.

1. A company claims that their lightbulbs burn for more than 1000 hours. To test that claim, a consumer agency buys 75 lightbulbs and determines that the mean burn time is 1009.3 hours with a standard deviation of 12 hours. State the null and alternative hypotheses in proper notation.

$H_0: \mu = 1000$          $t = 6.71169...$

$H_a: \mu > 1000$          p-value $= 1.686 \times 10^{-9} << 0.05$

reject null. there is good reason to think their bulbs burn longer than 1000 hrs.

2. In the above scenario, it turns out that the company's claims are actually false, but your hypothesis test concludes that they are true. What kind of an error is this? Type I or Type II? Explain your reasoning.

Type I — incorrectly rejected $H_0$.

3. A polling company would like to determine the proportion of the population that considers themselves independents (rather than Democrats or Republicans) in their town. Previous polling results put the proportion of independents at 35%. The Registrar of Voters believes that the proportion has increased. The polling company reports that a sample of 1000 people found that the proportion of independents was 37%. Is there sufficient evidence to support the Registrar's claims? Be sure to state the null and alternative hypotheses, the test statistic and either the p-value or critical value ($\alpha = 0.05$), and the conclusion of your test.

$H_0: p = 0.35$          $z = 1.32598...$

$H_a: p > 0.35$          p-value $= 0.0924 > 0.05$

fail to reject the null. This is not sufficient evidence to think # of independents has increased.

4. A company claims that their lightbulbs burn for more than 1000 hours. To test that claim, a consumer agency buys 75 lightbulbs and determines that the mean burn time is 1009.3 hours with a standard deviation of 12 hours. Conduct a test to determine if the company's claims are substantiated.

Skip this. it's the same as #1