Stat 1350, Hypothesis Tests II, Spring 2015 Name KEY

Instructions: For each of the situations below, set up an appropriate hypothesis test. State the two hypotheses with correct notation and then conduct the test. What is the standard score (z-score) of the test? What is the P-value of the test? How does it compare to the stated level of significance (use 0.05 if none is stated)? What do you conclude? Reject or Fail to Reject the null hypothesis? Interpret the results in the context of the problem (how would you describe what the results mean to someone who does not know statistics)?

1. A paint manufacturer fills cans of paint using a machine that has been calibrated to fill the cans to contain an average μ of 1 gallon (128 ounces) each. To test whether their machine has come out of calibration, the manufacturer takes a random sample of 25 cans and finds that they average 128.2 ounces with a standard deviation of 2 ounces. Is this strong evidence that the filling machine is set too high and thus is no longer calibrated properly?

ZTest : Stats

$H_0: \mu = 128$

$H_a: \mu > 128$

$\mu_0 = 128$

$\sigma = 2$

$\bar{x} = 128.2$

$n = 25$

$\mu > \mu_0$

$\Rightarrow$ $z = .5$

$p = .3085 > .05$ fail to reject

this is not strong evidence that the machine needs recalibrated

2. The Survey of Study Habits and Attitudes (SSHA) is a psychological test that measures the motivation, attitude, and study habits of college students. Scores range from 0 to 200 and follow (approximately) a normal distribution with mean of 115 and standard deviation $\sigma = 25$. You suspect that incoming freshman have a mean μ which is different than 115, because they are often excited yet anxious about entering college.

$H_0: \mu = 115$

$H_a: \mu \neq 115$

Ztest: Stats

$\mu_0 = 115$

$\sigma = 25$

$\bar{x} =$

$n =$

$\mu \neq \mu_0$

} data not provided

3. A city ordinance requires that more than 75% of its residents must agree to the construction of new public buildings (using tax dollars) before any such structures can be built. A proposal has been made to build a new recreational facility in the city, and sponsors of the proposal want to conduct a small survey to see if it would be approved if put to an official vote of all residents. A simple random sample of 150 residents revealed that 123 supported a change (and 27 did not).

1PropZTest

$H_0: p_0 = .75$

$H_a: p_0 > .75$

$p_0 = .75$
$x = 123$
$n = 150$
prop $> p_0$

$\Rightarrow z = 1.97989\ldots$
$p = .02385\ldots < .05$ reject null H_0

There is good evidence to think the true proportion is greater than .75

4. Scientists think that robots will play a crucial role in factories in the next several decades. Suppose that in an experiment to determine whether the use of robots to weave computer cables is feasible, a robot was used to assemble 500 cables. The cables were examined and there were 15 defectives. If human assemblers have a defect rate of 0.035, does this data support the hypothesis that the proportion of defectives is lower for robots than for humans? Use a 0.01 significance level.

$H_0: p = .035$

$H_a: p < .035$

1PropZTest

$p_0 = .035$
$x = 15$
$n = 500$
prop $< p_0$

$\Rightarrow z = -.60835$
$p = .2714 > .05$

fail to reject H_0

There is not good evidence to think rate of defectives is less for robots than for humans