

Econ 310 Final Exam, **Part 2**: Spring 2020

4 May 2020

5. (18 points) You want to test whether temperature affects mortality rates for kidney disease. You collect mortality rate data for 10 northern states and 10 southern states:

Northern	Mortality Rate	Southern	Mortality Rate
WI	4.7%	FL	3.4%
MI	8.8%	GA	3.9%
MN	7.6%	LA	6.4%
ND	2.0%	TX	2.6%
WA	5.5%	AZ	4.3%
NY	7.7%	NM	3.5%
MN	5.1%	MS	3.8%
MT	3.1%	AL	3.4%
ID	3.0%	CA	4.0%
NH	3.3%	SC	3.2%

- (a) Suppose the mortality rate across states has a normal distribution and the variance for northern states is equal to the variance for southern states. Test whether the mean mortality rate in northern states is higher than that in southern states at a 5% significance level.
- (b) In previous question, we assume that the variances of mortality rates in northern states and southern states are equal. Test whether this assumption is reasonable at a 5% significance level.

6. (12 points) One of the few negative side effects of quitting smoking is weight gain. Suppose that weight gain in the 12 months following a cessation in smoking is normally distributed with a standard deviation of 6 pounds. To estimate the mean weight gain, a random sample of 13 quitters was drawn; their recorded weight gains are listed here.

16 23 8 2 14 22 18 11 10 19 5 8 15

- Determine a 95% confidence interval estimate of the mean 12-month weight gain for all quitters.
 - Assuming you have lost the data of the last three quitters, re-estimate the 95% confidence interval with only the first ten observations (so you should exclude the values of 5, 8, and 15 from the data you used previously).
7. (20 points) Consider the bivariate probability distribution for random variables X (which can take on a value of 0 or 1) and Y (which can take on a value of -1, 0, or 1):

y/x	0	1
-1	a	0.1
0	0	0.4
1	0.2	b

- Given that $P(Y = -1) = 0.4$, solve for a and b .
- Calculate the expected value of Y .
- Suppose $Z = X + Y$. Calculate the expected value of Z using the laws of expected value.
- What is the probability distribution of Z ? Calculate the expected value of Z using its probability distribution.