

Math 263
Quiz 13 Spring 2014

Name _____

As some states legalize marijuana, there is much debate about whether using marijuana leads to the use of other, more dangerous, drugs. A 1995 European study¹ looked at the relationship between marijuana use and the use of other drugs (LSD, amphetamines, and cocaine). The table contains the results of a regression analysis of the percentage of 9th graders that had used marijuana against the percentage of 9th graders that had used other drugs.

| Other Drugs | Coefficients | Standard Error | t Stat | p-value | Lower 95% | Upper 95% |
|---------------|--------------|----------------|--------|----------|-----------|-----------|
| Intercept | -3.07 | 2.20 | -1.39 | 0.1974 | -8.05 | 1.92 |
| Marijuana use | 0.62 | 0.08 | 7.85 | 0.000003 | 0.44 | 0.79 |

- (a) What is the equation of the regression line that models this relationship? (If you use x and y , please define them!)
- (b) Interpret the slope of the line. Include units.
- (c) If we carry out a hypothesis test:
- (i) What is the null hypothesis?
- (ii) What is the alternate hypothesis?
- (iii) What can you conclude from the p -value? Can conclude that there is a significant relationship between the use of marijuana and other drugs?
Yes _____ No _____ (check one)
Reason:
- (iv) What can you conclude about the significance of the relationship from the confidence interval for marijuana use?
Significant _____ Not significant _____?
Reason:
- (d) Can you conclude from the study that marijuana use will lead to the use of other drugs?
Yes _____ No _____ (check one)
Reason:

¹ The European School Study Project on Alcohol and Other Drugs, 1995. <http://www.espad.org/>

ANSWERS

(a) The equation of the line is

$$\text{Other drug use (\%)} = -3.07 + 0.62 \cdot \text{Marijuana use (\%)}$$

(b) The slope, 0.62, tells us that for every additional percent of 9th graders who use marijuana, and additional 0.62% use other drugs. The two types of drug use are positively associated.

(c) For the hypothesis test:

(i) Null hypothesis is that the population slope is zero.

(ii) Alternate hypothesis is that the population slope is not zero.

(iii) Yes, there is a significant relationship because the p -value is tiny. (Much less than 5%.)

(iv) Significant. Since the confidence interval has both ends positive, the slope is likely to be between these values and thus unlikely to be zero.

(d) No. This is not a randomized trial; there could be confounding variables. For example, students who tried marijuana may be more ready to explore other drugs, but not because of the marijuana.