STAT 3400 - Homework #10

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Due April 20, 2023

Problem 24.8.2

a. The relationship between height and weight is moderately strong, linear and increasing

b. A hypothetical person that is zero cm tall is expected to weigh -105.01 kg. For each 1 cm increase in height we expect people to weigh 1.02 kg more on average.

c. H_0: The rate of change in weight as height increases is 0 for the entire population.

H_A: The rate of change in weight as height increases is not 0 for the entire population.

We reject the null hypothesis because p is less than our level of significance (0.05). Therefore, we have enough evidence to say that the rate of change in weight as height increases by 1 cm is not 0.

d. (0.72)^2 = 0.52. 52% of the variation in weight can be eliminated using height.

Problem 24.8.4

a. The standard error of the slope is approximately 0.025 by my eye, however, we are given that it's 0.03.

b.

```
qnorm(0.01)
```

```
## [1] -2.326348
```

```
qnorm(0.99)
```

```
## [1] 2.326348
```

0.604 +/- 2.326 * 0.03 = [0.53,0.67]

c. We are 98% confident that the true rate of increase in height as shoulder girth increases 1 cm is between 0.53 and 0.67.

Problem 24.8.6

a. H_0: The rate of change in annual murders per million as percentage of people living in poverty increases by 1% is 0.

H_A: The rate of change in annual murders per million as percentage of people living in poverty increases by 1% is not 0.

b. We reject the null hypothesis because p is lower than our level of significance (0.05). This means that we have sufficient evidence to say that the rate of increase in murders per million as percentage living in poverty increases by 1% is not 0, so percentage living in poverty is a useful predictor of murder rate.

c. 2.56 +/- 2*0.39

We are 95% confident that the rate of change in annual murders per million as percentage of people living in poverty increases by 1% is between 1.78 and 3.34.

d. The results from the hypothesis test and the confidence interval agree because we rejected the null hypothesis and 0 is not in the confidence interval.

Problem 24.8.8

a. The standard error of the slope appears to be approximately 0.25 by my eye. However, we are given that the standard error is 0.39

b.

```
qnorm(0.05)
```

```
## [1] -1.644854
```

```
qnorm(0.95)
```

```
## [1] 1.644854
```

2.56 +/- 1.645 * 0.39 = [1.92,3.22]

c. We are 90% confident that the true rate of increase in annual murders per million as percentage of people in poverty increases by 1% is between 1.92 and 3.22.

Problem 24.8.10

a. 7.1042 + 0.0047 * 30 = 7.2452 lbs

b. H_0: The rate of change in baby weight as father's age increases by one year is 0.

H_A: The rate of change in baby weight as father's age increases by one year is not 0.

The data do not provide convincing evidence that the model for predicting baby weights from father's age has a slope different than 0 because the p value associated with that slope is greater than our level of significance (0.05) so we fail to reject the null hypothesis and we don't have sufficient evidence that this slope isn't 0.

c. No, father's age is not a useful predictor of baby weight based on our conclusion.

Problem 24.8.12

a. The standard error of the slope is approximately 0.007 by my eye, but we are given above that the standard error is 0.006.

b. 0.005 +/- 2*0.006 = [-0.007,0.017]

c. We are 95% confident that the rate of change in baby weight as father's age increases by one year is between -0.007 and 0.017.