

# STAT 3400 - Homework #2

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Due February 1, 2023

## Problem 7.5.4

- a. Strong nonlinear decreasing
- b. Strong nonlinear increasing
- c. Strong linear increasing
- d. Weak linear increasing
- e. Weak nonlinear decreasing
- f. Moderate linear decreasing

## Problem 7.5.6

- a. The relationship between partners' ages is strong, linear and increasing.
- b. The relationship between partners' heights is weak, linear and increasing.
- c. The plot of partners' ages shows a stronger correlation because the points are much closer to where the line of best fit would be.
- d. Converting the units of height from centimeters to inches doesn't effect the correlation because both partners' heights were multiplied by the same factor (the number of inches in a centimeter) and this won't affect the shape, direction or strength of the correlation.

## Problem 7.5.12

- a. The relationship between temperature and crawling age is moderate, linear and decreasing.
- b. The relationship wouldn't change if temperature was measured in degrees Celsius (C) and age was measured in months.
- c.  $r = -0.70$

## Problem 7.5.18

Since there is a positive residual, the observed value was higher than the expected value so we underestimated the incidence of skin cancer.

### Problem 7.5.20

- a. The relationship between number of calories and amount of carbohydrates (in grams) that Starbucks food menu items contain is moderate, linear and increasing.
- b. The predictor variable is the number of calories and the outcome variable is the number of grams of carbs.
- c. We might want to fit a regression line to these data in order to predict the number of grams of carbs in other items given their number of calories using this line.
- d. The residuals vs. predicted plot tells us that items with lower predicted carbs have lower residuals than items with higher predicted carbs.

### Problem 7.5.24

- a.  $h = -0.357 + 4.034b$  where  $h$  is heart weight and  $b$  is body weight
- b. A cat with a body weight of 0 kg (not possible in real life) is expected to have a heart weight of -0.357 g.
- c. For every 1 kg increase in body weight, heart weight increases by 4.034 g on average.
- d. Using this model to predict heart weight based on body weight eliminates 1% of the variation in heart weight.
- e.  $r = \sqrt{r^2} = 0.1$