

**Homework 6 - Math 121**

**Name:** \_\_\_\_\_

*Due by 5:00pm Friday, October 30. Send a PDF with your solutions to [blins@hsc.edu](mailto:blins@hsc.edu).*

1. One side-effect of global warming is that more water will flow into the Arctic from rivers. The spreadsheet linked here ([Arctic Rivers Spreadsheet](#)) contains data on the total discharge from five of the largest rivers in Asia that flow into the Arctic Ocean. The discharge is measured in cubic kilometers of water.

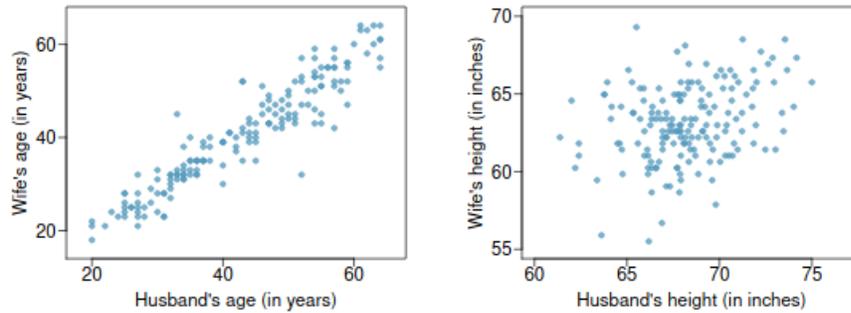
- (a) What is the correlation between year and discharge in the data?
  
- (b) Find a formula for the least squares regression line.
  
- (c) What is the rate of change of the discharge over time? Is it increasing or decreasing, and by how much on average every year?

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2. A statistics professor wants to know how well homework grades predict the final grades of students in his statistics class, so he looks at data from the 39 students who completed the class one semester. The data is linked here ([Homework vs. Final Grades Spreadsheet](#)).

- (a) What is the formula for the least squares regression line that predicts final grade based on a student's homework grade?
  
  
  
  
  
  
  
  
  
  
  - (b) On average, how well will a student with a 90 homework average do in the course?
  
  
  
  
  
  
  
  
  
  
  - (c) What about a student with a 50 homework average? What is their average final grade?
  
  
  
  
  
  
  
  
  
  
  - (d) What percent of the variance in the final grades is accounted for by the variance in homework grades?
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3. The Great Britain Office of Population Census and Surveys once collected data on a random sample of 170 married couples in Britain, recording the age (in years) and heights (converted here to inches) of the husbands and wives. The scatterplot on the left shows the wife's age plotted against her husband's age, and the plot on the right shows wife's height plotted against husband's height.



- (a) Which plot shows a stronger correlation?
- (b) Data on heights were originally collected in centimeters, and then converted to inches. Does this conversion affect the correlation between husbands' and wives' heights?

4. One of the questions asked on the General Social Survey is "Have you attended religious services in the last week. Here are the results broken down by education level for people surveyed with at least a high school education.

	Highest Degree Held			
	High School	2-Year College	4-Year College	Graduate
Attended services	400	62	146	76
Did not attend services	880	101	232	105

- (a) Find the  $\chi^2$  value for this two-way table and determine if it is statistically significant. You can use the  $\chi^2$  app on the course website.
- (b) Which group is the least likely to have attended religious services?
- (c) If you remove that group, is there a statistically significant association between education level and religious attendance for the other groups? What is the  $\chi^2$  statistic and what is the p-value?