

Activity Goals:

The purpose of this activity is to investigate the correlation between variables. Students will study:

1. The relationships between time, average hours worked and salary in the U.S for a period of 30 years
2. The effect of temperature on O-ring failure in space shuttle launches

Part 1a – Salary vs. Hours Worked

The table to the right lists the average number of hours worked in a week and the average weekly salary for U.S. production workers from 1967 to 1996. (*The World Almanac 1998*)

1. Construct a **scatter diagram** and comment on the relationship, if any, between these two variables.
2. Determine and interpret the **correlation coefficient** for hours worked and salary. Based upon the value of the correlation coefficient, is your answer to the first problem reasonable?
3. Based upon the data given, estimate the average weekly salary for a workweek of 33.8 hours. How confident are you in your estimate?
4. Increase/decrease in weekly hours:
 - a. For a production worker who wishes to increase weekly salary, would you recommend a decrease in hours worked per week? Why or why not?
 - b. Does a decrease in hours worked cause an increase in weekly pay?
 - c. What other variables could contribute to an increase in weekly pay?

Year	Weekly Hours	Weekly Earnings
1967	38	\$101.84
1968	37.8	\$107.73
1969	37.7	\$114.61
1970	37.1	\$119.83
1971	36.9	\$127.31
1972	37	\$136.90
1973	36.9	\$145.39
1974	36.5	\$154.76
1975	36.1	\$163.53
1976	36.1	\$174.45
1977	36	\$189.00
1978	35.8	\$203.70
1979	35.7	\$219.91
1980	35.3	\$235.10
1981	35.2	\$255.20
1982	34.8	\$267.26
1983	35	\$280.70
1984	35.2	\$292.86
1985	34.9	\$299.09
1986	34.8	\$304.85
1987	34.8	\$312.50
1988	34.7	\$322.02
1989	34.6	\$334.24
1990	34.5	\$345.35
1991	34.3	\$353.98
1992	34.4	\$363.61
1993	34.5	\$373.64
1994	34.7	\$385.86
1995	34.5	\$394.34
1996	34.4	\$406.26

Part 1b – Year vs. Hours Worked

Use the same table of data as in part 1a.

1. Construct a **scatter diagram** and comment on the relationship, if any, between these two variables.
2. Determine and interpret the **correlation coefficient** for the year and hours worked. Based upon the value of the correlation coefficient, is your answer to the first problem reasonable?
3. Based upon the data given, estimate the average weekly hours worked this year. (You may need to extend the axes on your graph to see this point. Right click the "year" axis on your scatter diagram. Choose "Format Axis" then under the "Scale" tab, make sure the maximum year is greater than or equal to this year. You then may have to extend the hours worked axis in the same manner.) How confident are you in your estimate?
4. Assuming there is a linear correlation between these two variables, what will happen to the average weekly hours worked in the future? Is it possible for this pattern to continue indefinitely? Explain.

Part 1c – Year vs. Salary

Use the same table of data as in part 1a.

1. Construct a **scatter diagram** and comment on the relationship, if any, between these two variables.
2. Determine and interpret the **correlation coefficient** for the year and hours worked. Based upon the value of the correlation coefficient, is your answer to the first problem reasonable?
3. Based upon the data given, estimate the average weekly salary this year. (You may need to extend the axes on your graph to see this point.) How confident are you in your estimate?
4. Assuming there is a linear correlation between these two variables, what will happen to the average salary in the future? Is it possible for this pattern to continue indefinitely? Explain.

Correlation Lab Rubric

Part		5	3	1	0
	Cover Sheet and Rubric Included	Complete	Both submitted but one incomplete	Only one included	neither included
1A	1.Scatterplot	Complete	1 or 2 elements missing	3 or more elements missing or data not plotted correctly	not included
1A	2. Correlation Coefficient	Accurate and question answered correctly.	Within 10% of correct answer and question answered correctly.	Wrong and/or question answered incorrectly	not included
1A	3. Estimate	Accurate and question answered correctly.	Within 10% of correct answer and question answered correctly.	Wrong and/or question answered incorrectly	not included
1A	4. Increase/decrease	a,b & c answered and strong support provided	a,b & c answered but support is weak	one or more questions not answered and/or no support offered	not included
1B	1.Scatterplot	Complete	1 or 2 elements missing	3 or more elements missing or data not plotted correctly	not included
1B	2. Correlation Coefficient	Accurate and question answered correctly.	Within 10% of correct answer and question answered correctly.	Wrong and/or question answered incorrectly	not included
1B	3. Projection	Reasonable projection shown on scatterpolt and estimate reasonable.	Projection shown on scatterpolt unreasonable or estimate unreasonable.	Projection not shown or estimate not provided	not included
1B	4. Future?	Question fully answered and strong support provided	Question fully answered but support is weak	Questions not fully answered and/or no support offered	not included
1C	1.Scatterplot	Complete	1 or 2 elements missing	3 or more elements missing or data not plotted correctly	not included
1C	2. Correlation Coefficient	Accurate and question answered correctly.	Within 10% of correct answer and question answered correctly.	Wrong and/or question answered incorrectly	not included
1C	3. Projection	Reasonable projection shown on scatterpolt and estimate reasonable.	Projection shown on scatterpolt unreasonable or estimate unreasonable.	Projection not shown or estimate not provided	not included
1C	4. Future?	Question fully answered and strong support provided	Question fully answered but support is weak	Questions not fully answered and/or no support offered	not included

Total: _____ / 65 = _____%

Revised Total: _____ / 65 = _____%