

3 Data Sets from YMM

Perform least squares regression on each data set. Determine if the linear model is a good fit. Support your answer.

Data Set A

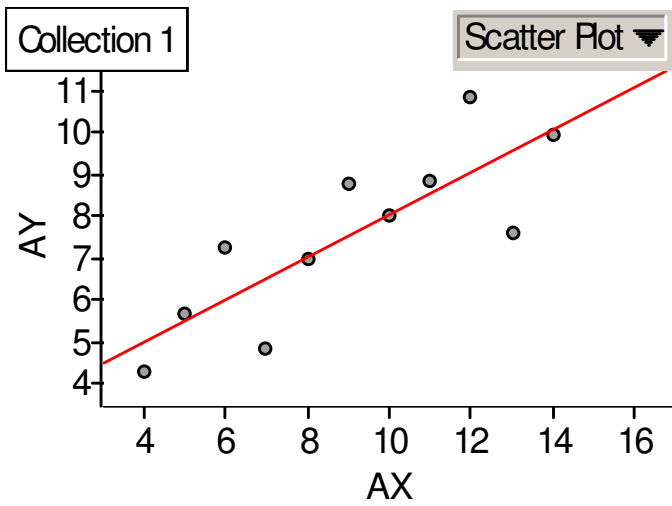
X	10	8	13	9	11	14	6	4	12	7	5
Y	8.04	6.95	7.58	8.81	8.83	9.96	7.24	4.26	10.84	4.82	5.68

Data Set B

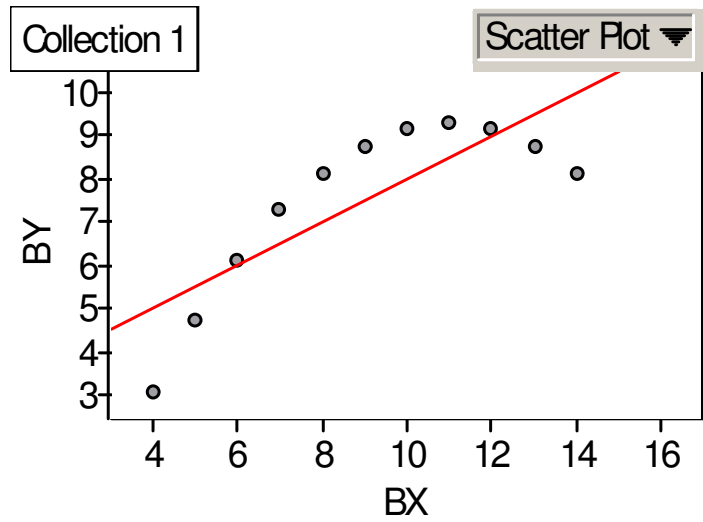
X	10	8	13	9	11	14	6	4	12	7	5
Y	9.14	8.14	8.74	8.77	9.26	8.10	6.13	3.10	9.13	7.26	4.74

Data Set C

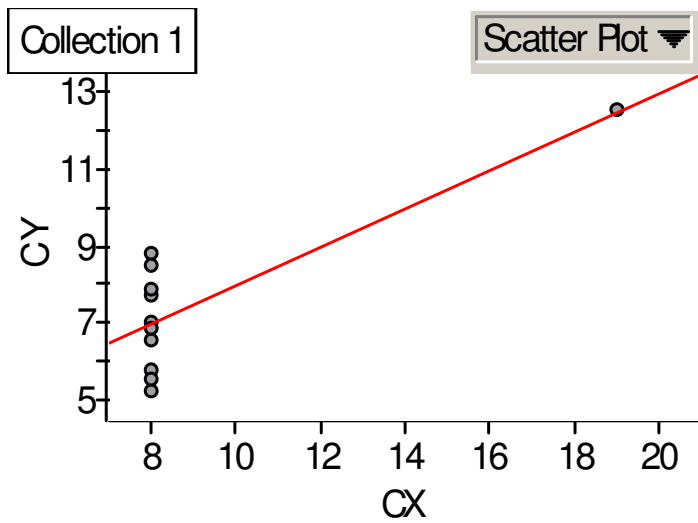
X	8	8	8	8	8	8	8	8	8	8	19
Y	6.58	5.76	7.71	8.84	8.47	7.04	5.25	5.56	7.91	6.89	12.50



$AY = 0.509AX + 3.0; r^2 = 0.67$



$BY = 0.500BX + 3.0; r^2 = 0.67$



$CY = 0.500CX + 3.0; r^2 = 0.67$

Regression of a Non-Linear Relationship – Spaghetti and Pennies

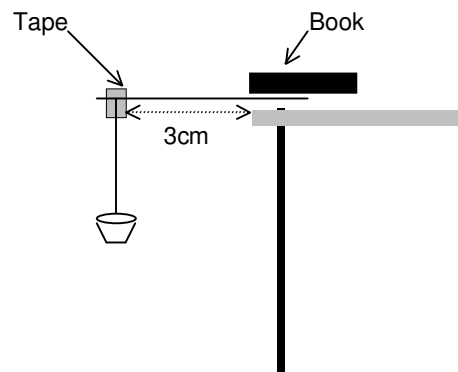
This lab activity explores data regressions and curve fitting while we answer a question you've probably never asked: how strong is spaghetti, anyway?

Materials:

- 6-8 strands of spaghetti
- 1 load cup (Dixie cup with floss loop)
- Scotch tape
- Ruler or meter stick
- 30 pennies

Setup:

Tie one end of the dental floss to the toothpick with a secure knot. (A slipknot or bowline will do.) Tie a small loop in the other end and tape it to the end of one strand of spaghetti with a small piece of tape. Lay the spaghetti on edge of the table so that the load cup hangs down and the distance between the edge of the tape and the edge of the table is precisely 3 cm. Weight the other end of the spaghetti with a book positioned so that it holds down the spaghetti precisely at the edge of the table.



Add the pennies to the cup one by one. **SUPPORT THE CUP** as you add each penny, and wait a second or two for it to stabilize before you add the next one. Vibrations and oscillations will severely decrease the load capacity of your spaghetti, so it pays to be careful.

When the strand breaks, write the total number of pennies (including the one that broke the strand) in the table below. Then repeat the experiment with a new length. If you're careful, you can slip the tape and floss off the spaghetti fragment and put it onto the new piece of spaghetti. Also, you can reuse the remainder of each strand. Increase the length by 1 cm each time at first, but feel free to change the increment as you go through the experiment.

Length											
Pennies											

Analysis:

1. Make a new collection and enter the data into two columns. Make a scatterplot of your data.
2. Since the graph isn't linear, we'll have to make a log-log graph to identify the proper exponent. So we have to make new columns with the logs of the old data in them:

Make two new columns called **lnlength** and **lnpennies**. Right-click on each, choose **Edit Formula**, and enter the formulas **ln(length)** and **ln(pennies)** respectively.


Is the new graph approximately linear? Is the slope positive or negative?

3. Computing the regression.


Add a least-squares line and write its equation below.


 $\ln(P) = \underline{\hspace{2cm}} \cdot \ln(L) + \underline{\hspace{2cm}}$

4. We can simplify the equation first by rewriting the coefficient as an exponent.

 $e^{\ln(P)} = e^{(\underline{\hspace{2cm}})}$

Now solve for P and write the result below:

 $P = e^{(\underline{\hspace{2cm}})} \cdot e^{(\underline{\hspace{2cm}})}$

 $P = L^{(\underline{\hspace{2cm}})} \cdot e^{(\underline{\hspace{2cm}})}$

5. Graph the model you found in #4 against the original data (**c1** and **c2**). How well does it fit?

Reflection:

R1. Complete the sentence below:

If $y = k \cdot x^r$, then if you graph $\ln y$ versus $\ln x$, the graph is a line with slope $\underline{\hspace{2cm}}$ and y-intercept $\underline{\hspace{2cm}}$.

Explain why or why not.

R2. If $y = P \cdot a^x$, would the graph of $\ln y$ versus $\ln x$ be a straight line? Explain why or why not.

R3. If we had used \log_{10} instead of \ln , would the values of the slope and y-intercept have changed? (Try it—just type \log instead of \ln !) Explain your result...

R4. Investigating the relationship between the intensity of sound and its distance from the source, you find the following data. Graph $\log I$ versus $\log D$ and find a formula for the relationship between I and D .

Distance (m)	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Intensity (w/m^2)	23.8	6.3	2.8	1.5	1.0	0.6	0.5	0.4

Redefining What It Means to Be Black in America

by Juan Williams, National Public Radio

November 13, 2007

One of the most damaging forces tearing at young black people in America today is the popular culture's pernicious image of what an "authentic" black person is supposed to look like and how that person is supposed to act.

For example, VH-1's highly rated Flavor of Love show features a black man in a clownish hat, a big clock hanging around his neck, spewing the N-word while demeaning black women. And hip-hop music videos celebrate the "Thug Life" and "gansta" attitude for any young black person seeking strong racial identity.

But a critic who points out that this so-called culture is defeatist and damaging — because it leads to high drop-out rates, record black-on-black murder statistics and a record number of out-of-wedlock births — is dismissed as a prude and a censor. Anyone questioning lyrics that glorify violence and make it cool to treat women as sex toys is told that the words reflect the reality of black life, and that they are "acting white."

Well, today there is new fuel for the debate.

A poll released by the Pew Research Center, in association with NPR, finds that 67 percent of black men and 74 percent of black women think rap music is a bad influence on black America. In fact, 59 percent of black men and 63 percent of black women think the whole hip-hop industry — from the jailhouse fashion of pants hanging low, to indifference to work and school — is equally detrimental to black America.

White and Hispanic Americans agree, too. The Pew poll finds 64 percent of whites and 59 percent of Hispanics agree on the damaging impact of hip hop.

This Pew poll is a uniquely reliable measure of black opinion. Unlike most polls, it has a large sample of black people, in addition to whites and Hispanics. Most polls include such a small number of blacks and Hispanics that it is hard to draw reliable conclusions about racial issues. This poll is different and its findings are stunning.

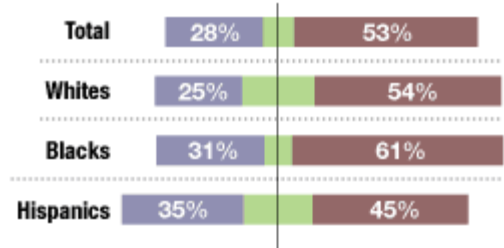
Damaging Media Images

Public Sees Growing Values Gap within the Black Community

In the last 10 years...

have the values held by middle-class black people and the values held by poor black people become more similar or more different?

More similar More different
No change/Don't know

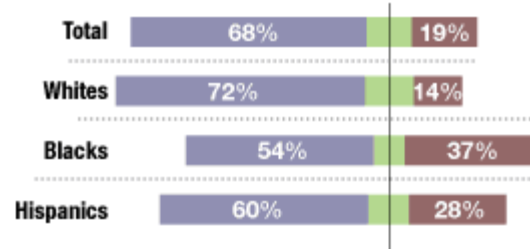


Values Converge Between Blacks and Whites

In the last 10 years...

have the values held by black people and the values held by white people become more similar or more different?

More similar More different
No change/Don't know



Note: Whites include only non-Hispanic whites. Blacks include only non-Hispanic blacks.

SOURCE: Pew Research Center

For example, young black people are the most upset (when compared to older blacks in the poll) about the way black Americans are portrayed on television and in the movies. Blacks under the age of 50 are much more likely to say media images of black people are worse today than they were 10 years ago.

And the proportion of young black people in the 18-29 age group who condemn the current media images of black people is 31 percent — higher than the 25 percent of blacks between the ages of 30-49, and the 17 percent of blacks in the 50-64 age group with similar disdain for black images in the media.

Similarly, when asked if the portrayal of black people on television and in the movies is harmful, it is young black people who most likely scream "Yes!" More than half (54 percent) of 18- to 29-year-old African Americans say black people are presented in a negative way in movies and TV shows. Fifty percent of black people ages 34-49 agree.

It is interesting to note that among black people 65 and older — who may have lived through times of rank racial images, from Amos 'n Andy-type minstrel shows to blaxploitation movies — the percentage concerned about current negative portrayals of black people drops to 18 percent.

Note that in every age group, the level of outrage about troubling images in movies and on TV is far less than the alarm over the corrosive impact of rap and hip-hop.

These revealing cultural findings are just part of a series of revelations about the reality of black opinion today.

Falling Concern over Immigration

Take the explosive subject of immigration. Last year, an anti-immigration group in Los Angeles, the Federation for American Immigration Reform, pulled together a group of black academics and activists to announce that most black Americans oppose guest-worker programs, want to close the U.S. border with Mexico and favor rounding up illegal immigrants. This got wide attention and was cited as Congress struggled with immigration reform earlier this year.

But the Pew poll finds that only 28 percent of African Americans say illegal immigration represents a "very big/big problem" in their community. There is a split on the question of whether blacks would have more job opportunities if there were fewer immigrants. The poll found 46 percent of black Americans disagree with that statement, while 44 percent agree.

When a poll asked a similar question in 1986, nearly three-quarters of black respondents said blacks would have more job opportunities if there were fewer immigrants. That would indicate that despite the higher profile of immigration today, black concern over the issue has actually dropped dramatically.

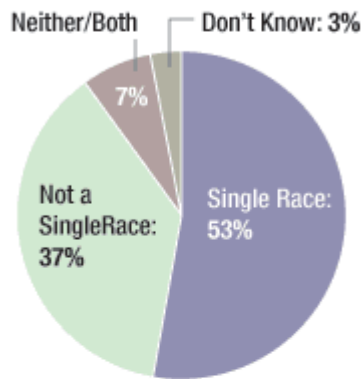
The level of concern over illegal immigration in black America is about the same as it is in white America (30 percent) and lower than it is among Hispanics (44 percent).

The big concerns for black Americans are lack of good jobs (58 percent); unwed mothers (50 percent); crime (49 percent); and drop-out rates (46 percent).

A Single Race?

Another revelatory finding in the Pew poll is that 37 percent of African Americans now agree that it is no longer appropriate to think of black people as a single race. A little more than half of the black people polled — 53 percent — agreed that it is right to view blacks as a single race. And the people most likely to say blacks are no longer a single race are young black people, ages 18-29.

Blacks Assess Their Racial Identity



Question:

Which of these statements comes closer to your view?

- Blacks today can **no longer** be thought of as a **single race** because the black community is so diverse.
- Blacks can still be thought of as a **single race** because they have so much in common.

Note: Based on non-Hispanic blacks

SOURCE: Pew Research Center

Forty-four percent of those young black people say there is no one black race anymore, as compared to 35 percent of the 30- to 49-year-old black population, and 34 percent of the black people over age 65.

The split in the black race comes down to a matter of values, according to the poll. In response to the question, "Have the values of middle-class and poor blacks become more similar or more different?" 61 percent of black Americans said "more different." White Americans agreed, with 54 percent saying there is a growing values gap between the black middle class and the black poor; 45 percent of Hispanics agreed, too.

At the same time, 72 percent of whites, 54 percent of blacks, and 60 percent of Hispanics agree that in the last 10 years, "values held by black people and the values held by white people (have) become more similar."

Making It in America

This leads to what may be the most important finding in the poll: 53 percent of black Americans now agree that "blacks who can't get ahead are mostly responsible for their own condition."

White America (71 percent) and Hispanic America (59 percent) agree that racism, while still a factor in American life, is not the principal force keeping poor black people in poverty. The more oppressive force, they seem to be saying, is a lack of strong families and the prevalence of values that do not emphasize education, hard work and perseverance.

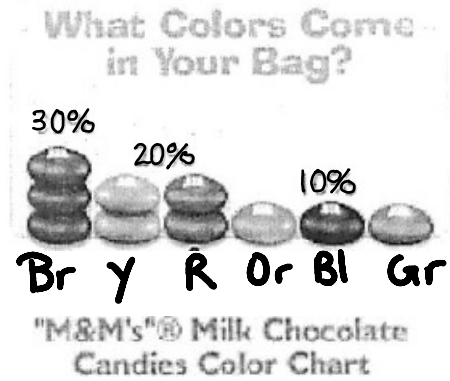
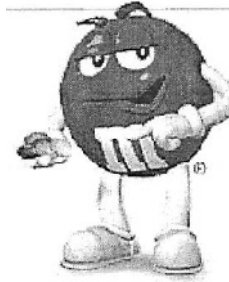
It is important to note that this is not some Pollyannaish view that ignores the reality of racism. Sixty-eight percent of blacks say they deal with racial discrimination today in at least two of the categories of experience cited in the poll: such as applying for jobs, buying a house, renting an apartment, applying for college, shopping or dining out.

But even with that hard-edged view of how often they have to deal with discrimination, a majority of black people say that regardless of the race of an individual, a black person can make it in America.

That is a very different tune from the one the rap lyrics want you to believe — the one that says black people are all victims unless they are society's thugs, pimps and criminals.

Goodness of Fit for Categorical Variables

Question:



Category: COLOR	Observed # (O)	Sample Proportion (\hat{p})	Expected # (E) $= n\pi$	$\frac{(O - E)^2}{E}$
Brown				
Yellow				
Red				
Orange				
Blue				
Green				
	Total =		Total =	Total (χ^2) =

Notes:

- For the “Question:” part of the worksheet, ask students, “based on the bag I just gave you and the image below, what question could a statistician ask?”
 - Potential 1st question – *Does my bag match up to Mar’s claim?*
 - Not a good question as answer is likely no and doesn’t address Mar’s claim as we know variability is part of the process. Need the answer to be mathematical – i.e. dealing with probability
 - Question: *What’s the probability of getting the break down in my bag?*
 - Doesn’t hit on the comparison & dependent nature of the bag/Mar’s claim.
 - Question: *What’s the probability of getting what’s in my bag given that Mar’s claim is true?*
 - Bingo!

Hazelwood School District v. United States (1977)

The U.S. government sued the City of Hazelwood, a suburb of St. Louis, MO, on the grounds that it discriminated against blacks in its hiring of school teachers. The statistical evidence introduced noted that of the 405 teachers hired in 1972 and 1973 (the years following the passage of the Civil Rights Act), only 15 had been black.

Upon doing research, it was found that 15.4% of teachers in St. Louis and the surrounding counties are African American, but it drops to 5.7% if you only count the counties close to Hazelwood & not the city.

You are a key witness for the United States government. You are hired as a statistics expert to determine if there is sufficient evidence to claim there was discrimination in their hiring practices.

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You are a key witness for the Hazelwood School District. You are hired as a statistics expert to determine if there is sufficient evidence to claim there was NOT discrimination in you hiring practices.