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2. Coincidence or not: Lottery winner; Twins deaths
3. Movie Receipts Stream Graph
4. Ranking Countries by Olympic Medals
5. Damned Lies and Statistics.
6. Students Consider Prostitution to Pay for Education. Reuters, May 18 2011.
7. Fewer Boys Following 9/11. May 24, 2010 by HealthDay News
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ABBREVIATED SUMMARIES OF FULL CHALLENGES:

- 1. How much Math do we need?** (1) State your conclusion: whether you agree or disagree with his answer. (2) Give your reasons.
- 2. Coincidence or not: Lottery winner; Twins deaths:** Read the stories involving a Canadian lottery winner and twin friars. State whether you think that each of the results is a coincidence or not and give your reason for each.
- 3. Movie Receipts Stream Graph :** Study the stream graph of [Movie Box Office Receipts from 1986-2008](#). (1) How would you describe the change in total receipts over this 22 year period? (2) Are there any seasonal patterns repeated yearly? (3) What is required to compare attendance at different times for this graph? (4) What are three ways (explanations, factors, confounders) that might explain an increase in revenues over time?
- 4. Ranking Countries by Olympic Medals:** Study the table of selected results from the 2008 Summer Olympics competition in Beijing. Come up with TWO other methods of ranking Olympic countries that would result in different countries (other than the U.S.) at the top.
- 5. Damned Lies and Statistics:** #1. Joel claims that “every statistic is the product of choices” Do you think this is true for all statistics or just for all social statistics? Give your reasons. #2. Give two examples of social statistics that are strongly influenced by choices in definition or measurement.
- 6. Students Consider Prostitution to Pay for Education.** Identify a small change in defining "sex work" that could increase the survey percentages? Identify a small change that could decrease the percentage. 4. Suppose a reader mistakenly thinks this study found that one in three students surveyed would consider prostitution to finance their education. Who is responsible for this mistaken conclusion: the authors of the study, the journalists who wrote the article, the reader, or someone else?
- 7. Fewer Boys Following 9/11.** 1) What exactly was the data – the statistical comparison -- used to support the title of this article? 2) What choices might plausibly influence how the “14% more” statistic was obtained? 3) How could one determine if these statistics were simply coincidences?
- 8. Is Sylvia Browne a real psychic?** Q1. What is the difference between "cold reading", "warm reading" and "hot reading"? Q2. Suppose you wanted to determine if Sylvia really had psychic abilities. Suppose she allows you to come on stage and ask her one question. 2a) Formulate a question that you think would be most useful in determining whether she had real psychic ability or was a fraud. 2b) Address whether her answer (right or wrong) could just be coincidence. Q3. Some of Sylvia's predictions have proven to be false. Give two reasons why some people continue to believe in a future-teller when some of her predictions have proven to be wrong?
- 9. Matt Badiali's Investment Recommendations** Challenge: 1) **Does** the following article claim that you would have made the returns shown for these stocks if you had followed his advice at that time on when to buy and when to sell? If not, why not? 2) Could you expect an average gain of 170% (the average on these stocks) on all his recommendations? If not, why not? 3) Is a gain of 200% the same as doubling? If not, why not?
- 10. Romney takes slight lead over Obama:** 1) Does Romney really have the lead in the nation? 2) What does the phrase “95 percent margin of error” really mean – in your own words? What does it

include; what does it exclude (leave out)? 3) How does the 3.3 percentage point credibility interval in this case relate to the 1 point difference between Romney and Obama?

- 11. School Dropout-Rates by Family Income and Race/Ethnicity:** Study the two tables showing "status-based school dropout rates by family income". 1) Describe a percentage in the upper table in a single sentence referencing both the column and row headings. 2) Describe a percentage in the lower table in a single sentence referencing both the column and row headings. 3) Does the top table say that "40% of school kids from low-income families (bottom 20%) are high-school dropouts? If not, why not? 4) Does the bottom table say that "39% of dropouts are Hispanics living in low-income families" (bottom 20%)? If not, why not? 5 and 6) Give a qualitative (non-arithmetic) summary of what is happening in the top table and bottom tables.
- 12. School Dropout Rates by Race/Ethnicity and Language Skills:** Study the three tables showing "status-based school dropout rates by race/ethnicity and language skills." 1) Describe a percentage in each table in a single sentence referencing both the column and row headings. 4) Give a qualitative (non-arithmetic) summary of what is happening in each table.
- 13. Marriages last longer than living together:** 1. What statistical evidence does the story offer in supporting the claim in the title of this challenge? 2. Use the data in this story to argue that couples that live together first are more likely TO STILL BE TOGETHER three to five years later than those who marry first. 3. The article notes that "those who don't have children are more than twice as likely not to last 10 years." What are two different groups that could be the basis of this comparison?
- 14. Halloween Consumer Survey (2012):** Challenge: Explain these three results. Q1. Page 1: The percentage who hand out candy (75.7%) is higher than the percentage of adults who participate in Halloween (71.5%). Explain how or why. [Notice the associated counts in column 2]. Q2. Page 3: For any year or item (costumes, candy, decorations or greeting cards), amount spent per BUYER (Average of Buyers) is always more than the average spent per PERSON (Net Average). Explain how or why. Q3. Page 3: The average BUYER spent MORE on greeting cards in 2007 (\$11.89) than in 2012 (\$10.72), but the average PERSON spent (net average) LESS on greeting cards in 2007 (\$3.92) than in 2012 (\$4.34). Explain how or why. [Notice the associated "percentage buying"].
- 15. IRS Income Mobility Study:** Study the attached table involving quintiles (fifths). Answer four questions about the table. Q7. Are these results (see Q3 or Q6) good or bad? Give your reasons.
- 16. Distribution of Likely US Prez Voters by Party Affiliation:** Last week, the Gallup Poll released data on the party affiliations OF JUST THE LIKELY VOTERS for this election and for the last two presidential elections. 1. Describe one number in the top (three choices) section and one number in the bottom (two choices) section of this data. 2) Using JUST THIS DATA, predict the winner of this election (even if you are posting after the election and the other candidate won). 3) Using only this data, give your reasons WHY THIS DATA supports your choice.
- 17. US Presidential Voting by When Voters Decided:** Study the exit poll data from the last two presidential elections shows which candidate voters decided to vote for and when they decided. Challenge: 1. For the 2008 election, describe one number in the top section and one number in the bottom section of this data. Using THIS DATA for both elections and YOUR IDEAS on when people decided in this election, (2) predict the winner of this election (even if you are posting after the election and the other candidate won) and (3) give your reasons.

- 18. US Racial Attitudes Survey:** 1) Examine this survey. Estimate how long would the average adult need to answer all the questions via a phone interview?. 2) How could this data be used to argue that prejudice AGAINST WHITES HAS INCREASED from 2010 to 2012? 3) How could this data be used to argue that prejudice AGAINST BLACKS DID NOT INCREASE from 2010 to 2012? 4) How could this data be used to argue that prejudice AGAINST WHITES HAS INCREASED from 2010 to 2012? 5) Comment on any difficulties in inferring racial prejudice AGAINST BLACKS 6) Comment on the quality of the data obtained from this survey. [Redo numbers]
- 19. Percentage of US women who never married by age and race:** Challenge: 1) Describe the 2009 percentage for white women ages 25 to 29 2) Describe the trend between 1986 and 2009 in the percentage shown for any of the groups of women ages 25-29. 3) Do you expect the percentage shown for women ages 25-29 to continue increasing in future years to reach that of Asians or Blacks - or to peak out at a lower percentage? Give your reasons. 4) Do you expect the percentage shown for white women ages 55 and over to continue around 5% -- or to increase to match that of Hispanics or Blacks? Give your reasons.
- 20. Penny Increase in Sales Tax Yields Big Results:** Arizona politicians want to increase Arizona's sales tax by a penny from 5.6 cents per dollar. 1. Write out 42.6 billion as a whole number (with the proper number of zeroes). 2. Math: What is the % increase in sales tax by adding a penny to the 5.6 cent rate? 3. Which of these gives a bigger percentage change for a single-unit change: a change in a small amount or in a big amount? Why?
- 21. Pioneer Press Circulation Statistics:** Study the circulation statistics for the Pioneer Press. 1. Which of these measures of success is most susceptible to how groups are defined or quantities are measured? 2. Which of these statistics is expected (not a surprise)? Why? 3. While most news papers have decreasing circulation, what might explain why circulation is increasing for the Pioneer Press? 4. What relevant measures of success were omitted?
- 22. Big Consequences of Small Changes: Home Runs, Obesity and Super-Rich**
1. Steroids, bat speed and home runs. How could such a small increase (a 5% increase in bat speed; a 4% increase in ball speed) give the big increase in D (50% more homers)? 2. Obesity: Could a small decrease (25% or 10%) in the morbidly obese cutoff give a big percentage increase (double?) in the number of adults who are classified as morbidly obese? How or why? 3. Super-rich: Suppose the minimum income for super-rich were cut by 20% to from 2.5 million to 2 million. Could this small change (20%) result in a much bigger percentage increase (double?) in the number of those classified as super-rich? How or why? 4. What circumstances (what kind of situation, what principle) unifies these three examples?
- 23. Bigger Tableware Helps Widen Waistlines** 1) What opportunities are there for bias in this study? 2) Evaluate the quality of the argument. How strongly do these statistics support the point of the story? Why? Give your reasons. 3) What, if anything, could be done to make the study better/stronger?
- 24. Giving Criminals Monetary Support after Release :** Challenge: 1. Evaluate the strength of a study. How good is this study in testing the benefit of monetary support? Why? 2. Is there anything that could have made it better? Either way, indicate why. RESULTS: This data shows the percentage of the ex-convicts in the group that were re-arrested within the first 12 months after release.
>> Group: I (50%), II (49%), III (49%), IV(49%), V (48%), VI (49%).
Assume the 95% margin of error on this data is 5.5 percentage points.

FULL CHALLENGE DETAILS:

- 1. How much Math do we need?** G. B. Ramanathan wrote "How Much Math Do We Really Need?" in the Washington Post. A copy of this article is available in Moodle section 8: Story2010: How Much Math Do We Really Need? (1) State your conclusion: whether you agree or disagree with his answer. (2) Give your reasons.
- 2. Coincidence or not: Lottery winner; Twins deaths**
Read the stories involving a Canadian lottery winner and twin friars. State whether you think that each of the results is a coincidence or not and give your reason for each. Canadian lottery winner story: 1) Son's death, 2) Daughter-in-law's drowning, 3) Son suing neighbors 4) Wife's leaving, 4) winner "now in a seniors home with this mind apparently fading". Twin friars story, 5) their dying on the same day of the same cause 6) Identify methods, principles or criteria by which one can distinguish a real coincidence from an apparent coincidence. Number your answers 1 thru 6 so reviewers can better evaluate your thinking. Three reviews required. These two stories are available in Moodle. They are available on the web at www.statlit.org/cp/2012-lottery-winners-bad-luck.pdf and www.statlit.org/cp/2011-Twin-Friars-Die-On-Same-Day.pdf
- 3. Movie Receipts Stream Graph**
Stream graphs are a new form of interactive visualization that present data in a fluid time-based format. See the stream graph of [Movie Box Office Receipts from 1986-2008](#). Play around with the visual tool. Move mouse over different movie revenue streams; move time slider at the bottom of the graph. Each movie is a separate layer. Revenues are measured by layer thickness: top minus bottom of the layer. Total revenue is the sum of all layers at that time. Based on the data provided, answer these four questions:
 1. How would you describe the change in total receipts over this 22 year period?
 2. Are there any seasonal patterns repeated yearly?
 3. What is required to compare attendance at different times for this graph?
 4. What are three ways (explanations, factors, confounders) that might explain an increase in revenues over time?
- 4. Ranking Countries by Olympic Medals**
Background: The attached table presents selected results from the 2008 Summer Olympics competition in Beijing. Using TOTAL MEDALS EARNED, most U.S. news organizations declared the United States the winner. While this is one way of summarizing the results and creating a summary ranking, it is not the only way. **CHALLENGE:** Come up with TWO other methods of ranking Olympic countries that would result in different countries (other than the U.S.) at the top. Be sure to state which country would be at the top of each of your ranking methods. Your method may include medal type and any other related factor(s) obtained from outside sources.
- 5. Damned Lies and Statistics.**
Read the article [Telling the Truth About Damned Lies and Statistics](#) by Joel Best.
 - #1. Joel claims that "every statistic is the product of choices" Do you think this is true for all statistics or just for all social statistics? Give your reasons.
 - #2. Give two examples of social statistics that are strongly influenced by choices in definition or measurement. [These must be ones that you haven't seen in the text, discussed in class or encountered in the homework.] For each statistic, give another way it might be defined or presented and indicate whether this would increase or decrease the value?
Copy at www.StatLit.org/CP/2001BestChronicleHigherEd.pdf

- 6. Students Consider Prostitution to Pay for Education.** Reuters, May 18 2011.
Copy at www.StatLit.org/CP/20110518StudentsConsiderProstitutionToPayForSchool.pdf
1. What percentage of the students surveyed would consider prostitution to finance their education? If the article does not say, why not? Give your reason(s).
 2. Why is the percentage reported (one in three) so much higher than the percentage of students who have actually done sex work (4%)? Give your reason(s).
 3. Identify a small change in defining "sex work" that could increase the survey percentages? Identify a small change that could decrease the percentage.
 4. Suppose a reader mistakenly thinks this study found that one in three students surveyed would consider prostitution to finance their education. Who is responsible for this mistaken conclusion: the authors of the study, the journalists who wrote the article, the reader, or someone else? Give reasons for your choice.
- 7. Fewer Boys Following 9/11.** May 24, 2010 by HealthDay News.
Copy at www.StatLit.org/CP/20100524FewerBoysBornFollowing911Attacks.pdf
- 1) What exactly was the data – the statistical comparison -- used to support the title of this article?
 - 2) What choices might plausibly influence how the "14% more" statistic was obtained?
 - 3) How could one determine if these statistics were simply coincidences?
- 8. Is Sylvia Browne a real psychic?**
Sylvia Browne is billed as "the world's most renowned psychic and spiritual teacher". Sylvia has a website: <http://sylviabrowne.com/>
- Q1. What is the difference between "cold reading", "warm reading" and "hot reading"? See http://en.wikipedia.org/wiki/Cold_reading
- Q2. Sylvia Browne will be at Treasure Island Sunday Oct 21, 2012.
<http://www.treasureislandcasino.com/entertainment-mn/concerts-shows-mn/sylvia-browne/>
Suppose you wanted to determine if Sylvia really had psychic abilities. Suppose she allows you to come on stage and ask her one question. 2a) Formulate a question that you think would be most useful in determining whether she had real psychic ability or was a fraud. 2b) Address whether her answer (right or wrong) could just be coincidence.
- Q3. Some of Sylvia's predictions have proven to be false. See http://en.wikipedia.org/wiki/Sylvia_Browne Give two reasons why some people continue to believe in a future-teller when some of her predictions have proven to be wrong?
- 9. Matt Badiali's Investment Recommendations**
Challenge: 1) **Does** the following article claim that you would have made the returns shown for these stocks if you had followed his advice at that time on when to buy and when to sell? If not, why not? 2) Could you expect an average gain of 170% (the average on these stocks) on all his recommendations? If not, why not? 3) Is a gain of 200% the same as doubling? If not, why not?
ARTICLE: ... my name is Matt Badiali and I'm a geologist and investment analyst at Stansberry & Associates. I've shown investors how to make huge gains by identifying the best opportunities early.
269% on Chinese Silver: For example, not long ago, I introduced subscribers to an incredible opportunity to invest in China's emerging precious metals industry. I recommending buying shares of Silvercorp at \$3.25 and less than 2 years later I gave the sell signal when shares were trading for \$11.66. That's a gain of 269%.
339% on Chinese Gold: There's also the story of Jinshan Gold Mines which owns one of China's largest gold mines. More importantly, I discovered the company had the strong backing of the Chinese government – a government with a mandate to develop China's vast mineral wealth. I

recommended shares of Jinshan at \$1.05 and just 290 days later you could have sold those same shares for \$4.61 and banked a 339% gain.

There are many more examples such as: AuEx Ventures (**198%**), Veritas (**101%**), Rainey River (**161%**), Carbo Ceramics (**143%**), Royal Gold (**77%**), Petrobras (**166%**) and Pretium Resources, currently up **160%**. Source (10/14/2012):

<http://pro.stansberryresearch.com/1209CASROB39/EOILNA32/>

10. Romney takes slight lead over Obama: (10/11/2012).

Copy in Moodle and at www.StatLit.org/cp/20121010-Romney-Takes-Slight-Lead-Over-Obama.pdf.

Treat the phrase "credibility interval" as the 95 percent Margin of Error.

- 1) Does Romney really have the lead in the nation?
- 2) What does the phrase "95 percent margin of error" really mean – in your own words? What does it include; what does it exclude (leave out)?
- 3) How does the 3.3 percentage point credibility interval in this case relate to the 1 point difference between Romney and Obama?

11. School Dropout-Rates by Family Income and Race/Ethnicity

Attached is a graphic with two tables showing "status-based school dropout rates by family income". Copy at www.statlit.org/cp/1995SchoolStatusDropouts1.pdf 1) Describe a percentage in the upper table in a single sentence referencing both the column and row headings. 2) Describe a percentage in the lower table in a single sentence referencing both the column and row headings. 3) Does the top table say that "40% of school kids from low-income families (bottom 20%) are high-school dropouts? If not, why not? 4) Does the bottom table say that "39% of dropouts are Hispanics living in low-income families" (bottom 20%)? If not, why not? 5) Give a qualitative (non-arithmetic) summary of what is happening in the top table. 6) Give a qualitative (non-arithmetic) summary of what is happening in the bottom table.

12. School Dropout Rates by Race/Ethnicity and Language Skills

Attached is a graphic with three tables showing "status-based school dropout rates by race/ethnicity and language skills" Copy at www.statlit.org/cp/1995SchoolStatusDropouts2.pdf. 1) Describe a percentage in the top/first table in a single sentence referencing both the column and row headings. 2) Describe a percentage in the middle/second table in a single sentence referencing both the column and row headings. 3) Describe a percentage in the bottom/third table in a single sentence referencing both the column and row headings. 4) Give a qualitative (non-arithmetic) summary of what is happening in the top table. 5) Give a qualitative (non-arithmetic) summary of what is happening in the middle table. 6) Give a qualitative (non-arithmetic) summary of what is happening in the bottom table.

13. Marriages last longer than living together

On March 2, 2010, Yahoo News ran a story entitled Marriages last longer than living together? A copy is at www.StatLit.org/cp/20100302MarriagesLastLongerThanLivingTogether.pdf and in Moodle. Your challenge is to respond to these three questions about the news story.

1. What statistical evidence does the story offer in supporting the claim in the title of this challenge?
2. Use the data in this story to argue that couples that live together first are more likely TO STILL BE TOGETHER three to five years later than those who marry first.
3. The article notes that "those who don't have children are more than twice as likely not to last 10 years." What are two different groups that could be the basis of this comparison?

14. Halloween Consumer Survey (2012)

Based on the Sept 2012 Monthly Consumer Survey. Copy in Moodle (2012-Halloween-Survey) or at www.StatLit.org/cp/2012-Halloween-Survey.pdf. Challenge: Explain these three results. Q1. Page 1: The percentage who hand out candy (75.7%) is higher than the percentage of adults who participate in Halloween (71.5%). Explain how or why. [Notice the associated counts in column 2]. Q2. Page 3: For any year or item (costumes, candy, decorations or greeting cards), amount spent per BUYER (Average of Buyers) is always more than the average spent per PERSON (Net Average). Explain how or why. Q3. Page 3: The average BUYER spent MORE on greeting cards in 2007 (\$11.89) than in 2012 (\$10.72), but the average PERSON spent (net average) LESS on greeting cards in 2007 (\$3.92) than in 2012 (\$4.34). Explain how or why. [Notice the associated "percentage buying"].

15. IRS Income Mobility Study

Study the attached table. Study the example in the notes. Remember that quintiles are fifths. Lowest (1st) quintile is the lowest 20%. Copy in Moodle (Table2008: IRS Income Mobility) or at www.StatLit.org/images/2008-IRS-Income-Mobility.jpg

Q1. What percentage of those in the lowest (the 1st) income quintile in 1996 were in the highest (the 5th) income quintile in 2005? Q2. What percentage of those in the highest (5th) income quintile in 1996 were in the lowest (1st) income quintile in 2005? Q3. The percentage of the lowest (1st) income quintile in 1996 that jumped to the above-median quintiles (4th and 5th) in 2005 is GREATER than the percentage of the highest income quintile (5th) in 1996 that fell to the below-median quintiles (1st or 2nd) in 2005. ($15.2\% > 5.8\%$). Explain what this means or give some reasons why this is so.

Q4. What percentage of the lowest (1st) income quintile in 1996 stayed in the lowest (1st) income quintile in 2005? Q5. What percentage of the highest (5th) income quintile in 1996 stayed in the highest (5th) income quintile in 2005? Q6. The percentage of a given 1996 income quintile that stayed in their quintile in 2005 is highest for the "highest 1996 income-quintile group". (69.4%) Explain what this means or give some reasons why this is so. Q7. Are these results (see Q3 or Q6) good or bad? Give your reasons.

16. Distribution of Likely US Prez Voters by Party Affiliation

Last week, the Gallup Poll released data on the party affiliations OF JUST THE LIKELY VOTERS for this election and for the last two presidential elections. 1. Describe one number in the top (three choices) section and one number in the bottom (two choices) section of this data. 2) Using JUST THIS DATA, predict the winner of this election (even if you are posting after the election and the other candidate won). 3) Using only this data, give your reasons WHY THIS DATA supports your choice. Copy of the data is in Moodle and at www.StatLit.org/images/2012-Gallup-Distr-Likely-Voters-by-Party.jpg

17. US Presidential Voting by When Voters Decided

In exit polls, voters were asked "Who did you vote for?" and "When did you decided?" For each presidential election, the distribution of candidate voted for was shown for each of the "decided-when" times along with the distribution of all voters by when they said they decided. From this, data was obtained on the distribution of "decided when" for each major candidate. In the attached picture, data from the last two presidential elections shows which candidate voters decided to vote for and when they decided.

Challenge: 1. For the 2008 election, describe one number in the top section and one number in the bottom section of this data. Using THIS DATA for both elections and YOUR IDEAS on when people decided in this election, (2) predict the winner of this election (even if you are posting after

the election and the other candidate won) and (3) give your reasons. A copy of the data is in Moodle and at www.StatLit.org/images/2008-US-Prez-Voting-by-Decided-When.jpg

18. US Racial Attitudes Survey

Source: http://surveys.ap.org/data/GfK/AP_Racial_Attitudes_Topline_09182012.pdf or www.StatLit.org/CP/2012-AP-Racial-Attitudes.pdf Challenge: 1) Examine this survey. Estimate how long would the average adult need to answer all the questions via a phone interview? 2) Study the data about Whites in RAC7 on p 15. How could this data be used to argue that prejudice AGAINST WHITES HAS INCREASED from 2010 to 2012? 3) Study the data for RAC11 for Blacks on p 18. How could this data be used to argue that prejudice AGAINST BLACKS DID NOT INCREASE from 2010 to 2012? 4) Study the data for RAC11W on p 20 AND 21. How could this data be used to argue that prejudice AGAINST WHITES HAS INCREASED from 2010 to 2012? 4) Comment on any difficulties in inferring racial prejudice AGAINST BLACKS from the answers to the racial questions: RAC7 (p 15), RAC11 (blacks, p 18), RAC11W (whites, p. 20), RAC12 (p 23). 5) On page 28, comment on the results of BTH2B as compared with the results of BTH2A. What could explain this difference? 6) Comment on the quality of the data obtained from this survey. [Renumber]

19. Percentage of US women who never married by age and race

Data also at www.StatLit.org/CP/2009-SIPP-Percent-Never-Married-for-Women-by-Age-Race.jpg Challenge: 1) Describe the 2009 percentage for white women ages 25 to 29 in a single sentence that includes all this information. 2) Describe the trend between 1986 and 2009 in the percentage shown for any of the groups of women ages 25-29. 3) Do you expect the percentage shown for women ages 25-29 to continue increasing in future years to reach that of Asians or Blacks -- or to peak out at a lower percentage? Give your reasons. 4) Do you expect the percentage shown for white women ages 55 and over to continue around 5% -- or to increase to match that of Hispanics or Blacks? Give your reasons.

20. Penny Increase in Sales Tax Yields Big Results

Arizona politicians want to increase Arizona's sales tax by a penny. The extra tax income will be used to support a "\$42.6 billion plan to build and widen roads, and finance new and expanded mass-transit programs." On 17 May 2008, Arizona's sales tax was 5.6 cents per dollar. Answer these four questions (include the question numbers): 1. Write out 42.6 billion as a whole number (with the proper number of zeroes). 2. Math: What is the % increase in sales tax by adding a penny to the 5.6 cent rate? 3. Which of these gives a bigger percentage change for a single-unit change: a change in a small amount or in a big amount? Why? <http://shell.deru.com/~gdt/babs/2008/05/salestax.html>

21. Pioneer Press Circulation Statistics

Background: According to the Pioneer Press (11/18/2012), their market share is 68% (Sunday Print) and 72% (Daily Print). As compared to same 6-month period last year, Sunday total circulation is up (8%), and Wed-Fri circulation is up (9%), while page views for TwinCities.com are up (58%) and page views for Pioneer Press mobile products are up (204%) As compared with last year, Facebook fans are up (98%) and Twitter followers are up (115%). Challenge (Answer these questions and number your answers): 1. Which of these measures of success is most susceptible to how groups are defined or quantities are measured? 2. Which of these statistics is expected (not a surprise)? Why? 3. While most news papers have decreasing circulation, what might explain why circulation is increasing for the Pioneer Press? 4. What relevant measures of success were omitted?

22. Big Consequences of Small Changes: Home Runs, Obesity and Super-Rich

Big Consequence of Small Increase in Bat Speed from Steroids.

By enabling just a 4 percent increase in bat speed, steroids may turn hundreds of a season's long outs into home runs. Steve Mirsky reports. "It's been a fun baseball season. But the storm cloud of steroids has hung over the game for years now, especially tarnishing Barry Bonds's assault on the all-time home run record. Tufts University physicist Roger Tobin is a big baseball fan and recently did some calculations to evaluate just how much of an impact steroids could actually have on power hitting. When he crunched the numbers, he found the following: (A) steroids might bring about a 10 percent increase in muscle mass. (B) That extra muscle could help a batter swing five percent faster. (C) And that extra bat speed could cause a ball to jump off the bat 4 percent faster. Doesn't sound like much. (D) However, if you add four percent initial velocity to a model distribution of trajectories of batted baseballs, you can increase homers by a full 50 percent." Challenge:

1. Assuming claims A, B and C (above) are true, how could such a small increase (a 5% increase in bat speed; a 4% increase in ball speed) give the big increase in D (50% more homers)?

2. For adults 70" tall, suppose that morbid obesity is defined as weighing more than 280 pounds (BMI > 40). Suppose that the definition were changed to weighing more than 250 pounds (a 10% change). Could this small change (10%) give a big percentage increase (double?) in the number of adults 70" tall who are classified as morbidly obese? How or why?

Source: <http://www.vitaclinics.co.uk/obesity-surgery/what-is-morbid-obesity.htm>

3. Suppose that being super-rich had been defined as having a yearly taxable income of over 2.5 million dollars. Supposing the minimum income were cut by 20% to two million dollars. Could this small change (20%) result in a much bigger percentage increase (double?) in the number of those classified as super-rich? How or why? 4. What circumstances (what kind of situation, what principle) unifies these three examples?

23. Bigger Tableware Helps Widen Waistlines

Read the article at www.StatLit.org/CP/2006-Bigger-Tableware-Helps-Widen-Waistlines.pdf

1) What opportunities are there for bias in this study? 2) Evaluate the quality of the argument. How strongly do these statistics support the point of the story? Why? Give your reasons.

3) What, if anything, could be done to make the study better/stronger?

24. Giving Criminals Monetary Support after Release

Challenge: 1. Evaluate the strength of a study. How good is this study in testing the benefit of monetary support? Why? 2. Is there anything that could have made it better? Either way, indicate why. THESIS: Recidivism (committing a crime after release from prison) is a major social problem. Many in criminal justice thought that giving a criminal monetary support upon their release from prison would reduce their likelihood of "returning" to crime. STUDY: To test this conclusion, 2,000 prisoners (men and women about to be released from state prisons in Texas and Georgia) were randomly assigned into six groups. The average age (29.5) and the average length of sentence (2.8 years) were quite similar among the six groups. Group I got 26 weekly payments; groups II and III got 13 weekly payments. Payments were the equivalent of unemployment payments. Group IV got some aid in job placement. In the two control groups (V and VI) receiving no assistance, subjects in V were interviewed by researchers while subjects in VI received no contact – the normal treatment. RESULTS: This data shows the percentage of the ex-convicts in the group that were re-arrested and charged with a crime within the first 12 months after release.

>> Group: I (50%), II (49%), III (49%), IV(49%), V (48%), VI (49%).

Assume the 95% margin of error on this data is 5.5 percentage points.