

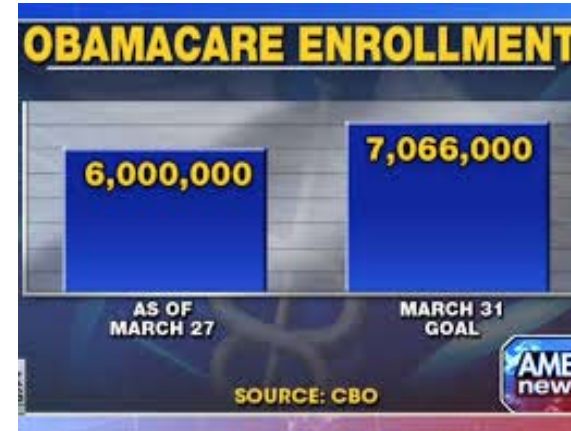
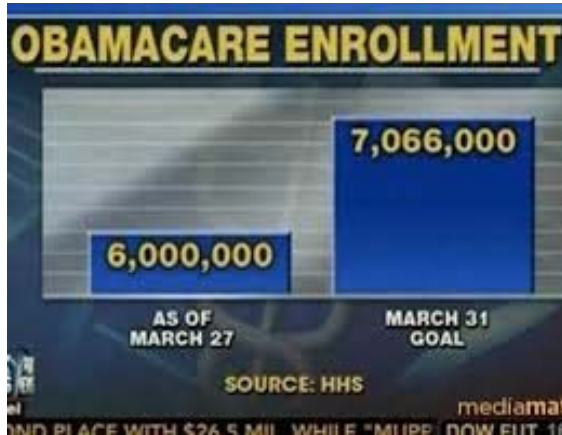
# Quantitative Ethics

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Joint Math Meetings 2015  
San Antonio, TX



## QUANTITATIVE REASONING FOR BUSINESS

*An Inquiry-Based Approach*

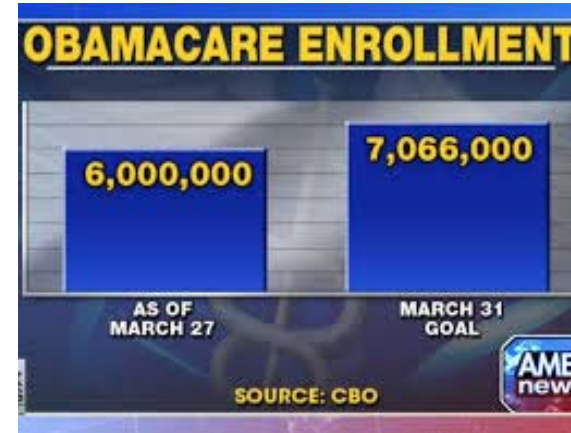
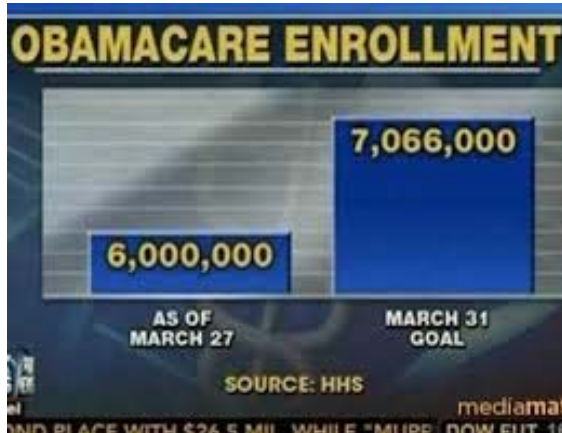


**Typical questions:** Which is more accurate?  
What should you “look out” for?

**Perspective:** consumer of quant. info

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**Quant. Ethics:** Is it appropriate to use a graph that poorly represents the facts if it furthers your political or other goals? Why or why not?

**Perspective:** producer of quant. info

**Quantitative Ethics:** What are the moral and societal implications of how we use data and other quantitative information?

Most students in one of my classes:  
It's OK to select data that supports a predefined conclusion. Evidence that sense of quant. ethics is lacking.

## **Preliminary Framework**

1. Decisions
2. Communication
3. Assumptions

## **Missing:**

1. Framing Questions
2. Serving Clients

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## About the course:

1. IBL
2. Conceptual
3. Authentic Bus. Prblms.
4. About 20 – 23 students
5. Beginning/Intmd. Alg.





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## Course Content:

1. Ratio, prop'n, percents
2. Data, Excel
3. Formulas
4. Linear/exp'l functions
5. Logs





## *Focus on Quantitative Ethics:*

Short, specific questions embedded in materials

## **CASE STUDIES IN QUANTITATIVE ETHICS:**

Entire lessons dedicated to ethical matters.

## Focus question related to decisions:

Should a bank offer a credit card customer a minimum payment so small that the balance continues to rise.

Note: the time it takes to pay off a loan is:

$$n = \frac{\ln\left(\frac{M}{M - rP}\right)}{\ln(1 + r)}$$

## Focus question related to communication:

First: Solve  $EAPR = \left(1 + \frac{APR}{m}\right)^m - 1$  for  $APR$

Second: Program Excel to calculate the APR  
you will quote to a customer in order  
to obtain a desired EAPR.

Ethics question: What is wrong with this?

## **Focus question related to assumptions:**

First: Solve a linear programming problem:  
Determine number of different types  
of stores to build in a location to  
maximize profit.

Ethics question: How could we make env. impact  
a constraint?

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## Student Sample

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Exploration 2.12

Valuing Stock

14. *Focus on Quantitative Ethics.* "Day traders" are people who spend their days buying and selling stocks on the secondary market rather than working at a job. The name comes from the fact that they frequently buy and sell a given set of shares over the course of a single day.

What is the problem (from a societal point of view) with day trading?

The problem from a societal view is that they are not working, they are at home watching the market non stop. This allows them to trade when the going is good and get rid of bad investments at a short notice. Others who can't watch the market as much are at a disadvantage and can lose money to those who watch the market day in and day out. These "day traders" can influence the market by buying and selling so often.

GREAT ANSWER!

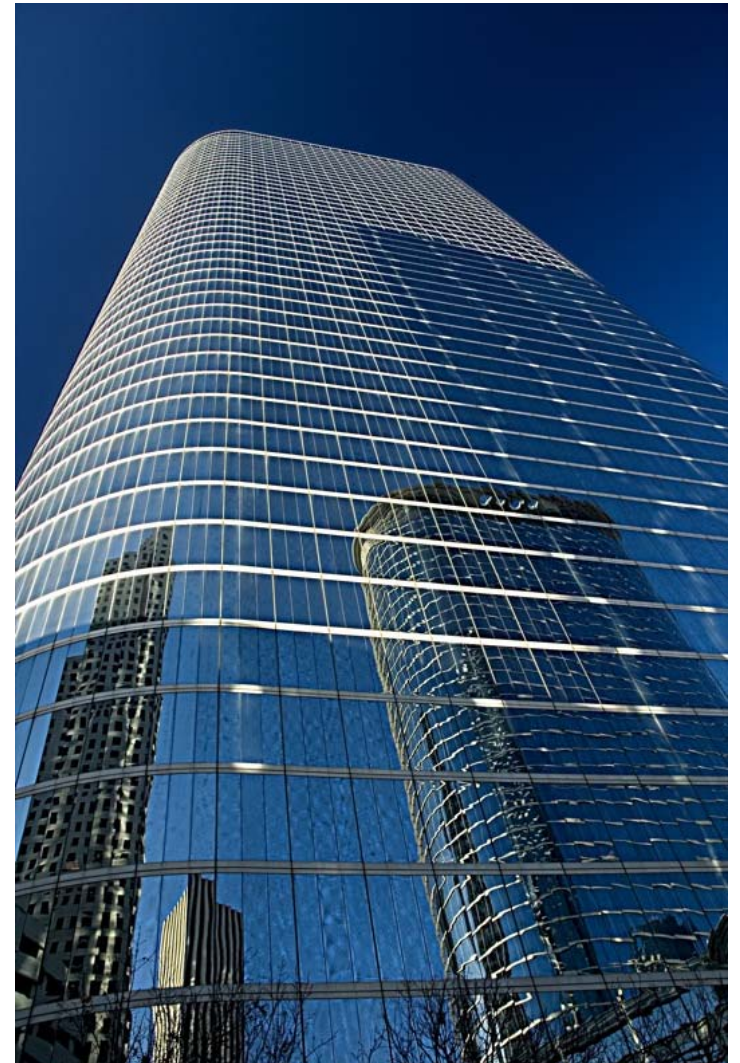
## **Case Studies in Quantitative Ethics: Ponzi Schemes and Multi-level Marketing**

1. Construct a mathematical model for a Ponzi scheme.
2. How can you identify consequences from your model
3. Compare to MLM



## **Case Studies in Quantitative Ethics: Enron**

1. Hiding debt in SPEs
2. Mark-to-Market Accounting



## **Case Studies in Quantitative Ethics: The 2008 Financial Collapse**

1. Asset-backed securities with res. mortgages
2. Assumption of independence by ratings agencies.

\* Comes from The Signal and the Noise  
(Nate Silver)

## Necessary Changes

- Prioritize more in the classroom!
- Make more accessible to my students.
- More ethical/moral **dilemmas**.

## **Potential Benefits:**

- Improve ethical behavior
- Connects math to important issues in world
- Potential for interdisciplinary collaboration
- Shows math is not as “black and white”

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