Goal of Today's Lab: Every 1010 covers geometry and visual perspectives (in our case geometry of the earth and universe), algebraic argumentation (in our case finance), consumer statistics, and chance and probability. As we begin finance, we'll also think more broadly about equations, fractions and percentages, and interest.
You will turn in today's lab.

First, ask me if you have any questions on the ASULearn homework.

3 OUT OF 2
PEOPLE
—— HAVE ——
TROUBLE
—— WITH ——
FRACTIONS

Controversy: Comparing Infinite Quantities

Today we routinely compare large or infinite quantities, but historically...

- Galileo Galilei (1564-1642) believed that the sizes of infinite sets could not be compared or contrasted
- Georg Cantor's (1845-1918) revolutionary ideas on the comparison of infinite sets has applications to many fields, including **continuous compounding of interest**. However, Cantor did not receive the recognition during his lifetime that he does today. Some mathematicians and theologians believed his work challenged the uniqueness and infinity of God, and hence strongly objected.
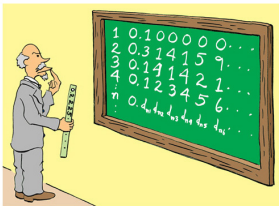
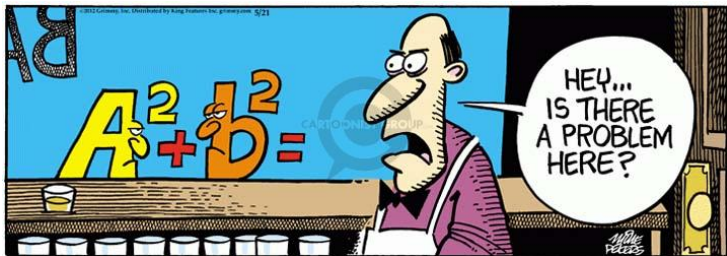

George showed it wouldn't fit in.

Reflecting on Comparisons and Equations
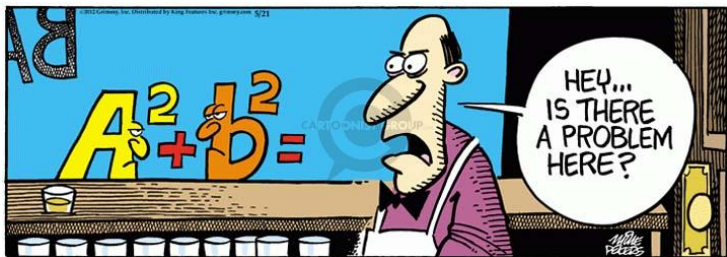
1. How would you define an equation?
2. Think of or research an equation you believe to be important (it does not have to be from our class). What does it express about the world or mathematics?

Reflecting on Comparisons and Equations

1. How would you define an equation?
2. Think of or research an equation you believe to be important (it does not have to be from our class). What does it express about the world or mathematics?
3. In a group of four people, share your responses. Next rank the equations in order of their truth as you discuss what the truth of an equation could mean. Write down what criteria you used in your ranking and the ordering of your equations. What notion of truth did you use in this context?

Empirical versus Platonic Equations

④ Next determine whether your equation is **empirical**, based on observation—an approximate relational fit to experimental data, or **Platonic**, named for Plato, proved from a given set of axioms. Ask me if you need help!

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Historically, Platonic was "truer" than empirical, but in the 20th century, Kurt Gödel (1907-1978) shocked the world when he showed that in any sufficiently strong formal axiom system, there are statements that are true but unprovable. His incompleteness theorems may be seen as placing limits on mathematical truth.

KURT! WHAT'S WRONG WITH THE CONSOLE?

UM...

I THINK THERE'S A PART MISSING...
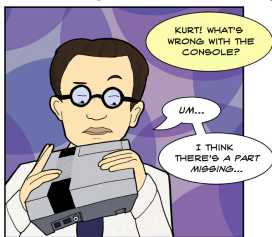
GÖDEL'S INCOMPLETE NES THEOREM

Beauty in Equations

5. Research the most beautiful equation in mathematics and report back on what you found.

Beauty in Equations

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6. Did Euler's equation arise $e^{i\pi} = -1$ in your research? *Like a Shakespearean sonnet that captures the very essence of love, or a painting that brings out the beauty of the human form that is far more than just skin deep, Euler's Equation reaches down into the very depths of existence.* [Keith Devlin]

In order to begin thinking about personal finance and placing that into the broader discussion of mathematics and what kind of world we might be working towards...

7. Research the web to find out how old the idea of charging interest is and write down what you find.

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7. Research the web to find out how old the idea of charging interest is and write down what you find.

8. Research the web to find at least one reason it makes sense to charge interest (for land, animals, money) and write down what you find.

9. Research the web to find at least one reason it doesn't make sense to charge interest and write down what you find.

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10. Share what you found with your neighbors. What was the strongest responses to each of the last 2 questions within your group?

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11. If you were going to design an independent space colony, who travels far away to explore the geometry of the universe and send data back to earth, would you charge interest within the colony?

Role of Chance and Probability

- quantitative measure of the likelihood of an event
- mathematical foundation of common sense and good judgment
- 0 to 1 (or 0% to 100%)
- law of large numbers
- experimental error provides an estimate of the inherent uncertainty associated with experimental procedures

12. Search the web to find how does risk relate to finance? Summarize what you found.

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12. Search the web to find how does risk relate to finance? Summarize what you found.

13. Share what you found with your neighbors. Did any of you find a connection to chance and probability?

Depth of Exam Responses and Course Ave %

14. Go to ASULearn and read the posting titled Depth of Responses on the Exam. Compare and contrast these answers with your own. Briefly comment on the similarities or differences.

15. Go back to the lab page and follow the link and directions there to compute your Approximate Course Average %