universe think-pair-share
Dr. Sarah's MAT 1010: Introduction to Mathematics

   Part A: Answer all sixteen questions below and type your responses for the forum. Add a new discussion topic with the subject as your preferred name and the post as your responses and any questions you have.

   Part B: Respond separately to at least two of your classmates postings in a meaningful way. Use their preferred name (like Dr. Sarah is mine), with something new that justifies your position on (at least) one of the questions. Don't just say, "Yeah, I agree." Instead, say, "Yes preferred name, but we also need to consider..." Or, "Preferred name, I don't agree because..." You might also pose questions, answer questions, extend ideas, or compare and contrast your responses and summarize what you chose and why.

1. In *The Heart of Mathematics* section 4.6: The Shape of Reality, a saddle was an example of what kind of geometry?
   a) Euclidean (flat)
   b) spherical
   c) hyperbolic
   d) more than one of the above
   e) none of the above

2. Does Carl Friedrich Gauss's mountain peak experiment to measure the angle sum prove that the universe is flat?
   a) yes and I have a good reason why
   b) yes but I am unsure of why
   c) no but I am unsure of why not
   d) no and I have a good reason why not

3. Where does *The Heart of Mathematics* address higher dimensional spaces?
   a) artistic representations
   b) mathematical spaces
   c) real-life data
   d) two of the above
   e) all of a), b), and c)

4. How many dimensions there were in the heart disease data from the universe hand in assignment?

5. Summarize how did the higher dimensional separating plane help in diagnosing heart disease or breast cancer?

6. What is the current consensus thought among scientists and mathematicians regarding how many dimensions are in the universe
   a) 2D hologram
   b) 3D
   c) higher dimensions
   d) there is no consensus

7. What justification or philosophical viewpoint was most compelling to you regarding how many dimensions our universe has?

8. What do you think about how many stars there are in the universe?

   a) I find the idea of finite stars most compelling

   b) I find the idea of infinite stars most compelling

   c) other

9. Which Euclidean equations have been connected to experiments on the geometry and shape of the universe

   a) sum of the angles in a triangle is 180 degrees

   b) brightness goes down as the square of the distance

   c) a density equation

   d) two of the above

   e) all of a), b), and c)

In your notes, summarize the experiments. In your post, list your multiple choice response.

10. In 1917, Albert Einstein used Bernhard Riemann's mathematics in order to present a hypersphere model for the universe that was consistent with his theory of relativity. We explored a number of different representations of the hypersphere, including visual and algebraic. Choose one representation from our class to summarize.

11. Which of the following are wraparound spaces?
    a) Euclidean 3-torus space

    b) hyperbolic Weeks manifold space

    c) spherical dodecahedral space

    d) two of the above

    e) all of a), b), and c)

   As you are answering these questions, review the differences between hyperbolic geometry, a hypersphere, a hypercube, and a 3-torus (they are all different!):

12. What is one real-life application of hyperbolic geometry?

13. One application of a hypersphere, a higher dimensional sphere, is that our universe might be that, just as Einstein used in his model for general relativity. Name a different real-life application of a hypersphere from the universe hand in assignment.

14. What would we see if a hypersphere passed by next to us?

15. Describe one way a hypercube can be formed?

16. How is a 3-torus formed from a cube?