12th Grade Assignment – Week #21

Announcement:

- During our study of the *Philosophy of Mathematics*, the "individual work" will largely consist of short reading assignments. These readings will come either from one of two sources:
    - The "reading packet", which consists of a collection of short articles for this unit, can be downloaded (titled "Phil of Math - Reader - ALL ESSAYS") from the 12th grade portal.
    - The book *Logicomix: An Epic Search for Truth* (by Apostolos Doxiadis and Christos Papadimitriou, which I suggested earlier for you to purchase). Please do not read ahead; wait until I assign each chapter before you read it.
- The group work assignments will often be based upon the (individual) reading assignments, and upon the lectures. Please be sure to watch the lectures and do the reading assignments before the group meetings so that the discussions can be fruitful. **For this reason, and because your personal schedule may not allow you to do the reading just before the group meeting, you should look at the assignment for the coming week a few days earlier than you typically would.**
- *An important request for all meetings that involve discussion questions.* In order to both help guide group work and to help inform the tutorial session, please do the following: Appoint a scribe for the meeting who will write a few words or sentences about what the group said for each of the questions. The scribe should then email these notes to the tutor after the meeting concludes.

Individual Work

- Be sure to read Hardy's essay "A Mathematician's Apology" before Thursday's group meeting.
  Special Notes:
    - Try to understand Hardy's example proofs, but don't get bogged down, or give up reading the rest of the essay. Be sure to read the ending.
    - At the bottom of page 3, there appears this formula: $Q = (2.3.5. \ldots .P) + 1$, which should instead be written as $Q = (2 \cdot 3 \cdot 5 \cdot \ldots \cdot P) + 1$.

Calculus Test. Take the *Calculus – Part II* test (found at the end of this document). As a group, you can decide whether to take the test individually, or to take it together as a group. If you decide to take it as a group, you'll need to schedule an extra group meeting.

Group Assignments:

for Tuesday. Discuss the following questions:

1. What is mathematics?
2. What do most people think that mathematics is?
3. How is math different from science?
4. Is math discovered or created (i.e., invented)?
5. If math is discovered, and it "has always been there", how did it get there?

for Thursday. This assignment is based upon Hardy's essay

1. What examples can you think of that demonstrate the beauty of mathematics?
2. What characterizes, in Hardy's opinion, the "best" mathematics?
3. Make sure that everyone understands the two example proofs he gives (Euclid's proof of an infinity of primes, and Pythagoras's proof of the irrationality of $\sqrt{2}$), and then choose one of these and write a two or three sentence summary to state how it was proven.
4. What does Fermat's "two-square theorem" say about the prime number 83?
5. What is Hardy apologizing about?
6. What does Hardy mean when he says: "I have never done anything useful."?
7. Is Hardy a theoretical mathematician, or an applied mathematican?

Calculus – Part II Test

1) A pedestrian is standing 15m away from a straight bike path. A cyclist is biking along that bike path at a constant rate of 12m/s. At what rate is the distance between the pedestrian and the cyclist increasing when the distance between the two is 40m?

2) A shipping company has a policy to only accept boxes that have a sum of girth and length not more than 84 in. What are the dimensions of the box with the largest possible volume?
(Hints: You may assume that the "ends" are squares. Girth is then the perimeter of this square, and the "length" is length of the longest edge.)

Girth = Distance around here

Length

Square end