MTH 117 Project

The Background
In order to use logic in mathematics (in particular, writing proofs) we must use definitions for which there is no ambiguity. Finding such definitions can be difficult. For example, say I define a cat to be an animal with four legs, a tail, and whiskers. There are many questions which immediately arise. Here just a few:

1. What is an animal?
2. What are legs?
3. What is a tail?
4. What are whiskers?

It may be the case that we have already defined these terms and so these questions are not really a problem. However, depending on how we define some of these terms, could we conclude that a catfish is a cat? Certainly catfish are animals. Also, maybe the definition of leg was so vague that it could include fins. Moreover, it is possible that the definition tail was so vague that it included the back fin of a fish. Finally, catfish have whiskers (hence the name). We could therefore conclude that catfish are cats (something we probably did not intend to do).

Maybe we could fix this problem by adding more attributes of cats. For example, we could add having fur to the definition of cat. However, what if we had what we would normally call a hairless cat? Is it still a cat? It doesn't have fur, so according to our definition it is not a cat despite the fact that most of us would agree that it is indeed a cat.

The Three Laws of Robotics
Isaac Asimov was a science fiction writer who is famous for introducing the three laws of robotics. The idea was that the robots would be made so that they had to obey these laws. Moreover, the laws were meant to be a set of rules which would protect humans from robots. The laws are:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

Some of Asimov's stories described ways in which robots could "break" the laws. In truth the robots did not break the laws (they couldn't, they are logical machines). However, it appeared that they broke the laws because they did not have good definitions. As an example, suppose we programmed a robot to believe all humans have hair on their head. If a robot comes across someone we would call bald, do the three laws still apply to this bald person?

The Project
You will create a story involving robots and Asimov's three laws. In the story something is to go wrong and at least one of the laws should be "broken". This "broken law" must occur because of faulty definitions given to the robot(s).

How you want to tell the story is up to you. Some possible choices are: a short story (4-6 pages double-spaced), a short video (10 to 15 minutes), a short play script (10 to 15 minutes if acted out), a computer game (come talk to me about how "long" the game needs to be). If you have another platform to tell the story you would like to use, please come to me so we can discuss it.

However you decide to tell the story, you must also submit a two page to three page (double spaced) summary of the story which includes what the faulty definitions were and how they were used to "break" the laws.

This summary should also include how the definitions could be fixed so that the law(s) wouldn't be broken. Finally, you should discuss if this new definition could lead to new unintended consequences.

You must work in groups on this project. The minimum and maximum size of the group depends on the medium in which you are telling the story.

1. Written short story: 3-5 people
2. Written short play script: 3-5 people. If you are going to perform the play for the class, then you can have 3-8 people.
3. Short video: 5-8 people
4. Computer game: 3-6 people
5. Other medium: meet with me to discuss group size.

Regardless how much actual work is being done by each group member, the grade received will be the same for each member. Keep this in mind when forming your groups.

Grading
The total project is worth 100 points. The actual story is worth 45 points, the summary is worth 45 points, and the email updates (see below) are worth 10 points.

Extra Credit
You will have the opportunity to receive and extra 20 points of extra credit for this project. To receive the extra credit, you will tell your story in front of the class. If you wrote a short story, you can do a dramatic reading of it. If you made a video, you can show it to the class. If you wrote a play, you can perform it. If you wrote a computer game, you can show it to the class. Doing the performance in front of the class is completely optional, but there is no other way to receive extra credit on this project. I will let everyone know when the performances will be scheduled later in the semester.

Dates
Nov 1: By this date, one person from each group needs to email me telling me who is in their group and what medium they plan to use to tell their story. (5 pts)
Nov 15: By this date, one person from each group needs to email me telling me their groups progress on the project. (5 pts)
Nov 30: The project is due.

References
If you would like to read some of Asimov's work, here is a short list of stories he has written which include the three laws. This list is nowhere near exhaustive.

- Liar!: A story about a robot which tells lies so as not to harm humans and thus obey the first law.
- Galley Slave: A courtroom drama in which a professor is suing the manufacturer a robot used to proofread his work. The claim is that the robot purposely changed the words to make it look like the professor was incompetent.
- Little Lost Robot: A story in which a robot has its first law modified by removing the clause about inaction.
- Caves of Steel: A detective story involving the 3 laws of robotics.