Course Project

Your project is to research one of the following paradoxes, write a paper about it, and make a presentation in class about it.

Banach-Tarski paradox A ball the size of a pea can be cut into finitely many pieces that can be reassembled into a ball the size of the sun.

Braess's paradox Adding capacity to a network can make it less efficient.

Hempel's paradox of the ravens Every black raven that Edgar Allan Poe observes gives him more confidence in the truth of the statement: "All ravens are black." The contrapositive statement "Everything that is not black is not a raven" is equivalent. Therefore a purple cow is also a confirming instance of the proposition that all ravens are black.

Newcomb's problem Box A has \$1,000 in it; box B has \$1,000,000 or \$0. You may take either box B alone, or you may take both boxes. Box B is empty if and only if a Being with superior predictive powers has guessed that you will take both boxes. What should you do?

Petersburg paradox A fair coin is flipped repeatedly until heads comes up. If heads comes up for the first time at toss n, you win 2^n dollars. What is a fair price to play the game?

Prisoner's dilemma In a competitive situation where all parties act rationally, they may arrive at an outcome that is inferior for all of them. Compare "the tragedy of the commons."

Surprise examination paradox There will be a surprise examination one day next week. If the examination has not been given by Thursday, then you deduce that it will be on Friday, so it will not be a surprise. Hence the examination cannot be on Friday. By induction, it cannot be on any of the preceding days either.

Zeno's paradoxes Perhaps the most famous paradoxes of all.

> "Was that a paradox?" asked Mr. Erskine. "I did not think so. Perhaps it was. Well, the way of paradoxes is the way of truth. To test Reality we must see it on the tight-rope. When the Verities become acrobats, we can judge them."
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> Oscar Wilde, *The Picture of Dorian Gray*