

Math 10: The Art and Practice of Mathematics  
Assignment 11  
Due Fri May 16

*Your solutions should be written so-as to be clear to an audience of fellow math 10 students.*

1. Consider the Cartel Game:

Profit in \$100s	D	C
D	(288,288)	(360,216)
C	(216,360)	(324,324)

Suppose we include the fact that litigation is risky and expensive. In particular, suppose that *lawyer's fees* are \$15,000 for each firm and that the loser of a lawsuit pays all lawyer's fees. In the event of a conviction, assume the court will award the plaintiff the *actual damages* of \$10,800 and *punitive damages* of \$10,000. Lastly, suppose that the firms believe there is a 75% chance of winning a lawsuit over breach-of-contract due to a defection from the cartel. Does a contract promising cooperation solve the prisoner's dilemma?

2. "If a prisoner's dilemma is repeated 100 times, the players are sure to achieve their cooperative outcome." True or False? Explain and given an example of a game that illustrates your answer.

3. Consider the Prisoner's Dilemma given by the game table

Points Scored	D	C
D	(2,2)	(4,0)
C	(0,4)	(3,3)

Suppose that the game is played repeatedly for an unknown number of stages. In particular, at the end of each stage, the players roll a standard six sided die. If a 1 is rolled, the game ends, otherwise, another stage is played. You may assume the risk-free interest rate is 0%.

- (a) Which strategy is better against a rival playing Tit-for-Tat: Always Cooperate or Defect Once?
- (b) Which strategy is better against a rival playing Tit-for-Tat: Always Cooperate or Defect Always?
- (c) Which among the following strategies is the best against a rival playing Tit-for Tat: Always Cooperate, Defect Once, or Defect Always?