Game Theory & Business Strategy
MGT 425

MIDTERM EXAMINATION

This exam has four questions of which you need to answer three. Note that you may attempt all of the questions. All of them will be graded and the best three will be counted.

Please identify any assumptions you are using in your analysis and show all work for partial credit.

You may use the back of a page if necessary, but clearly indicate that so I will know to look there. Work quickly if you wish to answer every question, but carefully.

QUESTION 1.

Consider the following strategic-form simultaneous game. Mork's payoffs are listed first.

Mindy

		X	Y	Z
	A	80 , 30	0 , 20	20 , 20
Mork	B	85 , 0	20 , 20	5 , 5
	C	95 , 25	5 , 25	5 , 25

a. Does either player have a strictly dominant strategy? If yes, list it/them. Briefly explain.

b. Does either player have a strictly or weakly dominated strategy? If yes, list it/them. Briefly explain.

c. List all pure strategy Nash equilibria of the above game.

d. If Mindy's payoffs in the top-left box (A,X) increased from 30 to 300, how would your answer to part c above change? Explain.

e. Is the following statement true or false (explain your answer): In any strategic-form game, if a player has a dominant strategy, then all of the other strategies of that player are dominated.

QUESTION 2.

You and another firm are engaged in a joint venture. Each year, you and the other firm decide whether to invest effort in the joint venture (which is costly), or simply free-ride on the effort of the other firm. The game is represented below.

		Other Firm	
		Effort	No Effort
You	Effort	25 , 25	0 , 50
	No Effort	50 , 0	10 , 10

a. Formally confirm that <u>this</u> game is a prisoner's dilemma.

b. Imagine that you expect to play this game with the Other Firm each year and forever. The Other Firm employs a grim trigger strategy, cooperating each year only if you have been cooperative in every previous year. What must be true of the interest rate (numerically, what must the range of interest rates be) for cooperation to be sustainable?

c. In one or two sentences, given your answer in part c., remark on how likely it is that cooperation will be sustained.

d. Imagine now that, if you play non-cooperatively, the Other Firm will not be able to observe this for two years. That is, the other firm still plays the grim trigger strategy, but does not begin punishment for non-cooperative behavior until two years later. According to the online reading, does this make cooperation more or less likely? Briefly explain.

QUESTION 3.

Criminals escape from the Island of Marou either by the East Bridge or the West Bridge. The Sheriff can monitor only one bridge at a time. Crossing the West Bridge is a more treacherous, dangerous journey (half of those who try to cross die on the way). The Sheriff is paid $1,000 whenever he captures a criminal, but not when a criminal dies on the way. Each player tries to maximize his payoffs – the chance of escape for the criminal and the expected bonus payment for the Sheriff. The resulting game is represented below.

		Sheriff	
		East	West
Criminal	East	0.0 , 1000	1.0 , 0
	West	0.5 , 0	0.0 , 500

a. Write down below the unique equilibrium of the above game.

b. What is the criminal's chance of escape in equilibrium?

c. What is the Sheriff's expected bonus payment in equilibrium?

d. To encourage higher effort on the part of the Sheriff, his bonus is doubled. Every time he captures a criminal, he receives $2,000. That is, the Sheriff's payoffs in the above game are all doubled. How does this change the equilibrium? Explain.

QUESTION 4.

Consider the following game. Player 1's payoffs are listed first, in bold:

		Player 2 X	Player 2 Y
		X	Y
	A	90 , 1	10 , 0
Player 1	B	10 , 0	50 , 1
	C	100 , 0	80 , 1

a. Imagine that player 1 makes a decision first and Player 2 makes a decision after observing player 1's choice. What is the subgame-perfect equilibrium of this game?

b. Imagine that player 2 makes a decision first and Player 1 makes a decision after observing player 2's choice. What is the subgame-perfect equilibrium of this game?

c. Are the outcomes in (a) and (b) above the same or different? Explain.

d. Briefly explain below what is Arrow's Impossibility Theorem?