Your pet hamster Freddie has been kidnaped. The kidnaper left a note stating that Freddie will be killed if you do not pay $500. You decide to analyze the situation with a Game Theory model in which your strategies are \pay ransom" and \not pay ransom," and the kidnaper's strategies are \kill" and \release." (You select your strategy ¯rst and then the kidnaper selects his strategy.) Your preferences are shown here, with larger numbers indicating more desired outcomes.

\I don't pay, he releases"	4
\I pay, he releases"	3
\I don't pay, he kills"	2
\I pay, he kills"	1

You call in an FBI pro¯ler who explains that there are two basic types of kidnapers: nasty and nice. The preference rankings of a nice kidnaper are:

\I get paid, release hamster"	4
\I get paid, kill hamster"	3
\I don't get paid, release hamster"	2
\I don't get paid, kill hamster"	1,

and the preference rankings of a nasty kidnaper are:

\I get paid, kill hamster"	4
\I get paid, release hamster"	3
\I don't get paid, kill hamster"	2
\I don't get paid, release hamster"	1.

(a) Write down two separate payo® matrices for cases of the nasty and nice kidnapers.

(b) De¯ne the terms: Dominant Strategy, Nash Equilibrium, Pareto Optimal Allocation.

(c) For each matrix determine whether either you or the kidnaper have dominant strategies.

(d) Find all Nash equilibria for these two games.

(e) Determine whether each Nash is pareto optimal.