

2. Two rock hounds each have one chunk of meteor. If the first rock hound splits her chunk into 4 pieces and the second splits her chunk into 4 pieces as well, each piece can be sold for \$25. Each rock hound can split her chunk into as many as three additional pieces without the other knowing (until they go to sell the pieces). However, for each additional piece above the 8 total pieces, the price per piece at which each can be sold for decreases by \$3.

(a) Construct the payoff matrix that gives the profits for each rock hound for all the possibilities.

(b) Find all the equilibrium points of this matrix.

(c) Find the reduced payoff matrix.

(d) Describe the best strategies for each rock hound.

3. Aaron and Alex engage in a pistol duel to the death. Each has one shot. Aaron may fire when he is 60 paces, 40 paces, or 20 paces away, while Alex may fire when he is 50 paces, 30 paces, or 10 paces away. Assume that, if one of the duelists fires and misses, the other one knows this and will walk up and kill the person who missed. Below are the percentages of success for each duelist when firing at the various number of paces.

Aaron		Alex	
Strategy	Percentage of Success	Strategy	Percentage of Success
60 paces	20%	50 paces	25%
40 paces	40%	30 paces	35%
20 paces	70%	10 paces	75%

We can view the duel as a zero-sum game, with the payoffs computed as follows. Decide who will fire first and compute that person's payoff. For example, if Aaron choose to fire at 60 paces, then Aaron shoots first, no matter what. He wins 20% of the time and loses 80% of the time, meaning his payoff will be $20\% - 80\% = -60\%$.

- (a) Find the payoff matrix, with Aaron as the row player.

- (b) Find the reduced payoff matrix.

- (c) Explain both players' optimal strategies.

- (d) What is the percentage of time Alex will be killed, assuming best play by both players?