## Decision Analysis:

As the owner of a major housing development company, you want to decide if you would stay in the house developing market or sellout your company. If you sold out the business, you are guaranteed a profit of $\$ 1,000,000$. Meanwhile, if you stayed in business you must either increase your prices or keep the old prices. Either way, the outcome of your prices will be affected by the government new laws.

There are indicators that the government new laws might affect the housing market. There is a $70 \%$ chance the government new laws will increase the market profit and will generate a revenue of $\$ 1,500,000$ if you increased your prices, otherwise (the other $30 \%$ ), you will obtain only $\$ 500,000$. Meanwhile, if you did not increase your prices, the new government laws will generate $\$ 1,000,000$ with $70 \%$ chance, and $\$ 750,000$ otherwise.

What would be your decision? Solve this problem using neat diagrams and illustrations. Provide a complete mathematical solution for this problem to determine your solution.


Choose to stoy and increase prices.

Game Theory: Sequential Games:
G1:
Smith and John are coordinating in a sequential game to maximize their profit of a product that can come in two sizes, big and small. Smith will move first to choose big or small sizes, then john. Payoff is shown in the tree

- Sequential games: (Coordination Erne)

- Since John moves last, Jo John will choose high if Smith Crooks high ( 1,1 ) and low if Smith Chooses low $(2,2)$
- Knowing John is rational and will follow the above, Smith will Choose high to have more utility.
G2:
The construction development market problem discussed in the class
- Sequential Game: (Market)

- $P_{2}$ Mares last, and will chooses high if $P_{1}$ Enter $(82,82)$ \& <stacey catted $(h \mid E)\rangle$ or high fill $P_{1}$ chocs to stay out $(0,2 \infty)$ < Strategy called $h|S\rangle$
- $P_{i}$ wit Knowing that $P_{1}$ will choose high either way, $P_{1}$ will ravimike the utility by chose Enter

Game Theory: Simultaneous Games
Determine the Dominate Strategy and Nash Equilibrium for each of the following games that Maximizes the players payoffs

G1:

|  | X | Y |
| :--- | :---: | :---: |
| X | 2,2 | 5,1 |
| Y | 1,5 | 3,3 |

(2)


- Remember that D.S only cheeks the best Strategy for the playa. - DiS $S_{1}(x)$ Since $2>1$ if $P_{2}$ played $x$, and $5>3$ if $P_{2}$ played $y$.
- D. $S_{2}(x)$ Since $2>1$ \&' $P_{1}$ played $x$, ad $s>3$ if $P_{1}$ played $y$
- Also Remember that $P$ \& $P_{2}$ only Control their own actin, So verve down flap if you are $P_{1}>$ Lett $\&$ Right if you are $P_{2}$ D. $_{\text {S }}=(x, x) \rightarrow-R(2,2)$ Nash Equilibrium:
- Remenber:. Best Response
- No incentive to deviate

| $x$ | 4 |
| :---: | :---: |
| $x$ | 2,2 |
| 1,5 | 3,1 |
|  |  |

for $P_{1}$ :
if $P_{2}$ played $x$, he lest play $x$ to gain 2 instead of $y 1$ for $y$ if $P_{2}$ played $y$, he best ply $x$ to gain 5 instead of 3 for $y$
for $P_{2}$ :
if. P. played $x$, he best play $x$ to gain 2 instead fo if if y if $P_{1}$ Played $y$, he best play $x$ to gain 5 instead of 3 for $y$ $N \cdot E:[X, X) \approx \pi(2,2)$

|  | $L$ | $R$ |
| :---: | :---: | :---: |
| $U$ | 3,2 | $0,-1$ |
| $D$ | $-1,0$ | 2,3 |

(1) $V$|  | $R$ | $R$ |
| :--- | :--- | :--- |
|  |  |  |
| $-1,0$ | 2,3 |  |

DiS:
No dominate Strategy of $P_{1}: u$ is better than $D$ if $P_{2}$ Played $L \quad 3>-1$ but $D$ is better than $U$ if $P_{2} P$ Played $R \quad 2>1$

Save for $P_{2}$

NV:
$P_{1}$ : if $P_{2}$ played $L, P_{1}$ best ply $u$ to gain 3 instead of -1 if $P_{2}$ played $R_{2} P_{1}$ best ply $D$ togain 2 instal of
$\stackrel{P_{2}}{\equiv}:$ if $P_{1}$ Played $U, P_{2}$ best play $L$ tagain 2 instal $f-1$ if $P_{1}$ played $D$, $p_{i}$ best play $R$ to gin zinstaed of $O$

$$
\begin{array}{r}
N \cdot E:(U, L) \sim \pi(3, L) \\
(D, R) \sim \pi(2,3)
\end{array}
$$

