Game theory (cont.)

Rival networks: During the 8-9 PM timeslot, two networks are competing for an audience of 100 million viewers. Each network can air either a comedy, drama, or reality show. The number of viewers network 1 will have for each pair of choices is shown. Assume all other viewers will watch network 2.

N1 \ N2	C	D	R
C	35, 65	15, 85	60, 40
D	45, 55	58, 42	50, 50
R	45, 55	58, 42	70, 30

Payoff matrix for N1

Payoff matrix for N2

constant sum game

Network 1's optimal strategy:

N1 \ N2	C	D	R
C	35	15	60
D	45	58	50
R	45	58	70

Optimal solution:

$$z = 45 \quad x_c = 0 \quad x_D = 1 \quad x_R = 0$$

A strategy where one of the probabilities is 1 is a **pure strategy**.

Another optimal solution:

$$z = 45 \quad x_c = 0 \quad x_D = 0 \quad x_R = 1$$

Actually, any strategy of the form $(0, \alpha, 1-\alpha)$ will be optimal.

for arbitrary α

Network 2's optimal strategy:

N1 \ N2	C	D	R
C	35	15	60
D	45	58	50
R	45	58	70

Optimal solution:

$$z = 45 \quad y_C = 1 \quad y_D = 0 \quad y_R = 0$$

An equilibrium is N1 airs drama, N2 airs comedy, N1 gets 45 million viewers and N2 gets 55 million viewers.

(Another equilibrium is N1 airs reality, N2 airs comedy, same viewership.)

N1 \ N2	C	D	R
C	35	15	60
D	45	58	50
R	45	58	70

A mixed strategy x dominates a mixed strategy x' if no matter what the opponent does, x does at least as well as x', and in some situation better.

N1 \ N2	C	D	R
C	35	15	60
D	45	58	50
R	45	58	70

N1 \ N2	C	D	R
C	35	15	60
D	45	58	50
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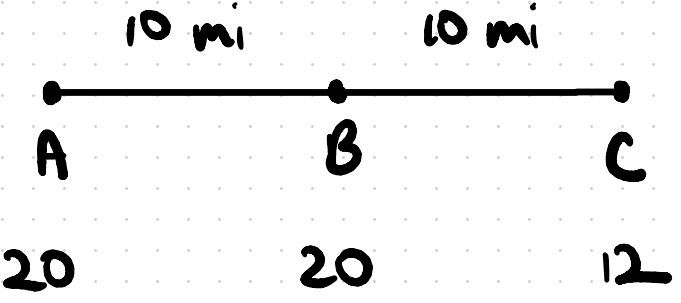
Two competing firms are deciding whether to locate a new store at point A, B, or C. 100 customers live at A, 100 live at B, and 120 at C. Each customer will shop at the nearest store. If a customer is equidistant from two stores, they will shop at either with probability $\frac{1}{2}$. Where will each firm locate their stores?



constant sum game