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— PROBLEM SET II —

Question 1:

If B is weak (α)

A \ B	Fight	Yield
Fight	1, -1	1, 0
Yield	0, 1	0, 0

↓ Fight is dominating strategy for A.

If B is strong ($1-\alpha$)

A \ B	Fight	Yield
Fight	-1, 1	1, 0
Yield	0, 1	0, 0

↓ Fight is dominating strategy for strong B

α: probability that firm A assigns to firm B being weak.

A → Fight payoff: $1 \cdot \alpha + (-1)(1-\alpha) = 2\alpha - 1$

A → Yield payoff: $0 \cdot \alpha + 0 \cdot (1-\alpha) = 0$

If we compare them:

$2\alpha - 1 = 0$

$\alpha = 1/2$

If $\alpha > \frac{1}{2}$, A will fight and weak type B will not fight. → (Fight, Yield)

If $\alpha < \frac{1}{2}$, A will yield and both types of B will fight. → (Yield, Fight)

Question 2:

$n = 5$ people

10 USD

If you contribute 10 USD, individual return = $\frac{M \cdot 10}{5}$

If you don't contribute, individual return = 10

> we should compare these values.

$$\frac{M \cdot 10}{5} = 10 \Rightarrow M = 5$$

If $M > 5$: players contribute all 10 USD

If $M < 5$: players do not contribute

If $M = 5$: players are indifferent.

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Question 3:

choosing cable connection : $P(n) = 20 - 0.01n$

choosing ASDL connection : $S(n) = 5$

$N = 2000$

n = number of people who choose P

$$T(n) = n \cdot P(n) + (N-n) \cdot S(n)$$
$$= n(20 - 0.01n) + (2000 - n) \cdot 5$$

For social gain to be positive:

$T'(n) > 0$

$20 - 0.02n - 5 > 0$

$\boxed{n < 750}$: socially optimal number of residents with the cable connection

If there was no cost,

$P(n+1) > S(n)$

$20 - 0.01(n+1) > 5$

$n < 1499$

But the cost is 50 TL.

50 TL → means 5 mbps. Because question says that the value of 1 mbps is 10 TL.

$P(n+1) - \text{cost} > S(n)$

$20 - 0.01(n+1) - 5 > 5$

$\boxed{n < 999}$: actual number of people who will choose cable int.

Question 4:

R \ C	C	D
C	5,5	-1,10
D	10,-1	0,0

r : rate of return

To sustain cooperating, defecting option should be disadvantaged.

If row player defects once, returned value should be less than the lost

gain = 10 - 5 = 5 lost = 5 - (-1) = 6

$PV = \frac{6}{1+r} \rightarrow 5 < \frac{6}{1+r} \rightarrow \boxed{r < 0.2}$ → r should be less than 0.2 so that defecting is not a good option for row player

If the game has a probability p to end, row player becomes more likely to cooperate. Because, in the last action row would choose defecting and gain 5 without lost.

Question 5:

$$E = \begin{cases} S(\text{Low}) = 0,\ S(\text{High}) = 1 \\ w(S=0) = A,\ w(S=1) = B, \quad (B > A) \\ \text{Prob}(a = \text{Low} \mid S=1) = 0 \end{cases}$$

We should add this order because employer should believe that education is a signal. Because if s/he does not believe, then there is no reason to educate.