# How to win the game based on number theory 

1. What is "Match"?

Rule (1) Players decide first attacker and second attacker and show their index fingers each other. (One finger signifies "one")
(2) First attacker does "choose" . (3) Second attacker does "choose".
(4) Repeat 2 and 3.
(5) Player who does "clear" both of opponent' s hand will be the winner.
"choose" =choose opponent' s hand and add selecting hand' s number of fingers.
"clear" = if the number of your fingers become more than four, the hand becomes out of use.
2. Motivation and purpose

I have been interested in "Match", which I used to play in my childhood.
So I decided to study on how to win this game in mathematical way.

## 3. Method

(1) First attacker ( $F$ ) has two hands and second attacker $(S)$ has one hand.
(2) $F$ has two hands and $S$ has two hands. ( $F: a \leqq b, S: c \leqq d, b+d \geqq 5$ )
(3) All finger is 1 .
4. PROCESS
(1)

(2) I used similar way to (1).
(3)
5. RESULT
(1) $F$ win.
(2) $b+c<5 \vee \mathrm{a}+\mathrm{d} \geqq 5 \mathrm{~V} 2 \mathrm{a}+\mathrm{c}<5 \rightarrow F$ win $b+c \geqq 5 \wedge a+d<5 \wedge 2 a+c \geqq 5 \rightarrow S$ win
(3) F win.
6. Future problem

I want to add the role of "divide".
"divide" ...If you have only one hand, you can divide the number of your fingers in two hands.

