

1 of - for some of x , all of $y \rightarrow$ all of x some of y

	P_0	P_1	P_2	P_3	P_4
$\exists x \forall y P$	0	0	1	0	0
$\forall y \exists x P$	0	0	1	1	1
$\forall x \exists y P$	0	0	1	0	1
$\exists y \forall x P$	0	1	1	0	1

A. is true

B is false as P_4 is false

2a. $A(x, y) = "x \text{ agrees with } y"$

~~$(\forall x \exists y A(x, y))$~~ ^{Is not}

~~$(\forall x \exists y \neg A(x, y))$~~ ^{does not agree with y}

(i) $\forall x \exists y A(x, y)$

(ii) ~~Someone disagrees with everyone~~

(iii) $\exists x \forall y \neg A(x, y)$

b. $(\exists x \exists y D(x, y)) \rightarrow (\forall x \exists y A(x, y))$

c. $\forall x \exists y D(x, y)$

3. a. $\forall t (kiwi(t) \rightarrow bicycle(t))$

$\forall t (bicycle(t) \rightarrow carry(t))$

$\forall t (kiwi(t) \rightarrow carry(t))$

3.

$\forall (Kiwi(t) \rightarrow Bicycle(t))$

$\forall (Bicycle \rightarrow Curry(t))$

$\forall (Kiwi(t) \rightarrow Curry(t))$

Valid

b. ~~$\forall (Kokoro(t) \rightarrow Sing(t))$~~

~~$(Sing(s))$~~

~~$Kokoro(s)$~~

invalid

c. $\forall (Kokoro(t) \rightarrow Bird(t))$

$(Bird(M))$

$Kokoro(M)$

invalid

4. n is a multiple of 3 $\Leftrightarrow \exists k \in \mathbb{Z} (n=3k)$

~~Let m & n multiple of 3~~
 ~~$4m - n$~~

$R=k$

~~$12k - 3R$~~

~~$12k - 3R$~~

$$4(3k) - (3R) = 12k - 3R$$

~~$12k - 3R$~~

a.s. 12 is a multiple of 3 ($12=3k, k=4$)
and 3 is a multiple of 3 ($3=3k, k=1$)
~~Thus $4m - n$ will always be~~
a multiple of 3.