

$\forall x \in \emptyset, P(x)$ is **always (vacuously) true**.

$\exists x \in \emptyset \mid P(x)$ is **always false**

$$\sim (\forall x \in X, P(x))$$

$$\equiv \sim (P(x_1) \wedge P(x_2) \wedge \dots)$$

$$\equiv \sim P(x_1) \vee \sim P(x_2) \vee \dots \quad \text{By DeMorgan's Law}$$

$$\equiv \exists x \in X \mid \sim P(x)$$

T	S	R	Q	P
K	L	M	N	O
J	I	H	G	F
E	D	C	B	A

1. Bob passed through *P*.
2. Bob passed through *N*.
3. Bob passed through *M*.
4. If Bob passed through *O*, then Bob passed through *F*.
5. If Bob passed through *K*, then Bob passed through *L*.
6. If Bob passed through *L*, then Bob passed through *K*.