

Recall: Predicates and Quantifiers

Red Table →

	True	False
$\exists x$	Example	Proof
$\forall x$	Proof	Counterexample

Missing
700# 28,
800# 4, 23

See ppt slides Logic 2

1] Exer.

- $\forall x \forall y (x > y)$ (domain of discourse is \mathbb{R}) F, for $x=7, y=5$
- $\exists x \exists y (x > y)$ (domain of discourse is \mathbb{N}) T, for $x=1, y=0$
- $\forall x \exists y (x < y)$ (domain of discourse is \mathbb{Z}) T, for $y=x+1$
- $\exists x \forall y (x > y)$ (domain of discourse is \mathbb{Q}) F, for $y=x+1$
- $\exists x \forall y (x < y)$ (domain of discourse is \mathbb{N}) F, for $y=0$
- $\exists x \forall y (x < y)$ (domain of discourse is \mathbb{Z}) T, for $x=y-1$
F, for $y=x$

- Domains:
 - X = all ics253 students
 - Q = all questions in an ics253 exam
- $P(x, q)$ = student x correctly solved question q
- Write the following in symbolic notation:

p	1	2	3	4
Joud	✓	✓	✓	✓
Wu	✓	✓	✗	✗
Fatime	✓	✓	✓	✗
Zainb	✓	✓	✗	✓
Majid	✓	✓	✗	✓

A. Everybody got full mark.

$$\forall x \forall q P(x, q)$$

B. Nobody got full mark.

$$\forall x \exists q \neg P(x, q) \quad \text{Joud}$$

C. Negation of A. (Not everybody got full mark).

$$\exists x \exists q \neg P(x, q) \quad \text{Wu}$$

D. Negation of B.

$$\exists x \forall q P(x, q)$$

E. There was a hard question nobody solved it.

$$\exists q \forall x \neg P(x, q)$$

F. Negation of E.

$$\forall q \exists x P(x, q)$$