

**Worksheet on Quantifiers**  
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## 1 Quantifiers and Negation

For each english sentence, write it in symbols: **no english words!** You can use such things as quantifiers ( $\exists$ ,  $\forall$ ), boolean operators ( $\sim$ ,  $\wedge$ ,  $\vee$ ,  $\Rightarrow$ ,  $\Leftrightarrow$ ), etc.

1. The set  $X$  has 3 elements.
2. The number  $x$  is odd.
3. Every rational number is an integer.
4. Every integer is odd.
5. If  $x \in \mathbb{Z}$ , then  $x$  is odd.
6. If  $x \in \mathbb{R}$ , then  $x \in \mathbb{Q}$ .
7. There exists an odd integer.
8. There exists a subset of the integers of cardinality 3.

9. If  $X$  has 3 elements, then there exists a subset of  $X$  having 2 elements.
  
10. For every integer, there's an additive inverse (something which adds to it to give 0).