Concepts of Maths: 1.5 Logic: Quiz

Decide whether each of the following statements is true or false.

1. $1 + 1 = 3 \Leftrightarrow 2 + 2 = 4$
2. $\neg\neg\ 1 + 1 = 3$
3. $\forall m, n \in \mathbb{N}\ 2m^2 = n^2$
4. $\exists m, n \in \mathbb{N}\ 2m^2 = n^2$
5. $\forall n, m \in \mathbb{Z}\ \exists r \in \mathbb{Z}\ n + r = m$
6. $\forall n, m \in \mathbb{N}\ \exists r \in \mathbb{N}\ n + r = m$
7. $\forall n \in \mathbb{N}\ (\exists m \in \mathbb{N} : n = 2m) \vee (\exists m \in \mathbb{N} : n = 2m + 1)$
8. $\exists x \in \mathbb{R}\ \forall y \in \mathbb{R}\ \neg xy = 1$
9. $\exists x \in \mathbb{R}\ \neg\exists y \in \mathbb{R}\ xy = 1$
10. $\neg\forall x \in \mathbb{R}\ \exists y \in \mathbb{R}\ xy = 1$
11. $\exists$ sets $A, B\ (\forall x : x \notin A) \wedge (\forall x : x \notin B) \wedge A \neq B$
12. $\exists n \in \mathbb{N}\ \forall m \in \mathbb{N}\ (m = n \Leftrightarrow m = 2)$
13. $\exists n \in \mathbb{N}\ \forall m \in \mathbb{N}\ (m = n \Leftrightarrow (m = 2 \vee m = 3))$