Test Your Understanding: relation

Test yourself by filling in the blanks.

1. A binary relation R from A to B is ____.
2. If R is a binary relation, the notation xRy means that ____.
3. If R is a binary relation, the notation $x \not R\ y$ means that ____.
4. For a binary relation R on a set A to be reflexive means that ____.
5. For a binary relation R on a set A to be symmetric means that ____.
6. For a binary relation R on a set A to be transitive means that ____.
7. To show that a binary relation R on an infinite set A is reflexive, you suppose that ____ and you show that ____.
8. To show that a binary relation R on an infinite set A is symmetric, you suppose that ____ and you show that ____.
9. To show that a binary relation R on an infinite set A is transitive, you suppose that ____ and you show that ____.
10. To show that a binary relation R on a set A is not reflexive, you ____.
11. To show that a binary relation R on a set A is not symmetric, you ____.
12. To show that a binary relation R on a set A is not transitive, you ____
13. Given a binary relation R on a set A, the transitive closure of R is the binary relation R^t on A that satisfies the following three properties: ____, ____, and ____.
14. For a binary relation on a set to be an equivalence relation, it must be ____.
15. The notation $m \equiv n \pmod{d}$ is read ____ and means that ____.

Answers

1. a subset of $A \times B$
2. x is related to y by R
3. x is not related to y by R
4. for all x in A; $x\ R\ x$
5. for all x and y in A, if $x\ R\ y$ then $y\ R\ x$
6. for all x, y, and z in A, if $x\ R\ y$ and $y\ R\ z$ then $x\ R\ z$
7. x is any element of A; $x\ R\ x$
8. x and y are any elements of A such that $x\ R\ y$; $y\ R\ x$
9. x, y, and z are any elements of A such that $x\ R\ y$ and $y\ R\ z$; $x\ R\ z$
10. show the existence of an element x in A such that $x \not R\ x$
11. show the existence of elements x and y in A such that $x\ R\ y$ but $y \not R\ x$
12. show the existence of elements x, y, and z in A such that $x\ R\ y$ and $y\ R\ z$ but $x \not R\ z$
13. R^t is transitive; $R \subseteq R^t$; If S is any other transitive relation that contains R, then $R^t \subseteq S$
14. reflexive, symmetric, and transitive
15. m is congruent to n modulo d; d divides $m - n$