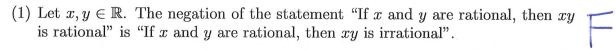
TRUE or FALSE. Justify.



- (2) Let $x, y \in \mathbb{R}$. The contrapositive of the statement "If x and y are rational, then xy is rational" is "If xy is irrational, then x is irrational or y is irrational".
- (3) The commutative property/axiom of addition says that x + y = y + x.
- (4) Every set of real numbers that is bounded above has a supremum.
- (5) There is a set S of real numbers such that $\sup(S)$ exists, but $\sup(S) \notin S$.
- (6) If a < b are real numbers, there is an integer $n \in \mathbb{Z}$ such that a < n < b.
- (7) Every nonempty set of real numbers has a smallest element (i.e., a minimum relement).
- (8) Every nonempty set of integers that is bounded below has a smallest element (i.e., a minimum element).
- (9) If $S \subseteq \mathbb{R}$ is bounded above, then there is a natural number b such that b is an upper bound for S.
- (10) Every set of real numbers satisfies the property that "for all $x \in S$, there exists a real number y such that $x < y^2$ ".
- (11) Every set of real numbers satisfies the property that "for all $x \in S$, there exists a real number y such that $y^2 < x$ ".
- (12) The supremum of the set $\{1/n \mid n \in \mathbb{N}\}$ is 1.
- (13) The supremum of the set $\{-1/n \mid n \in \mathbb{N}\}$ is -1.
- (14) The negation of the statement "for all $x \in S$, there exists a real number y such that $x < y^2$ " is "for all $x \in S$, there exists a real number y such that $x \ge y^2$ ".
- (15) If a sequence $\{a_n\}_{n=1}^{\infty}$ converges to 5, then for all natural numbers $n, a_n > 4$.

- (16) If a sequence $\{a_n\}_{n=1}^{\infty}$ converges to L, then there is some $N \in \mathbb{R}$ such that for all natural numbers n > N, $a_n = L$.
- (17) For every real number L there is a sequence $\{a_n\}_{n=1}^{\infty}$ such that $a_n \neq L$ for all $n \in \mathbb{N}$ and converges to L.
- (18) A sequence of positive numbers can converge to a negative number.
- (19) A sequence of positive numbers can converge to zero.
- (20) There is a set S of irrational numbers such that $\sup(S) = 2$.
- (21) Every increasing sequence is convergent.
- (22) Every convergent sequence is either increasing or decreasing.
- (23) If $\{a_n\}_{n=1}^{\infty}$ and $\{b_n\}_{n=1}^{\infty}$ are convergent sequences, then $\{a_n+b_n\}_{n=1}^{\infty}$ is a convergent sequence.
- (24) If $\{a_n\}_{n=1}^{\infty}$ and $\{b_n\}_{n=1}^{\infty}$ are convergent sequences, and $b_n \neq 0$ for all $n \in \mathbb{N}$, then $\{a_n/b_n\}_{n=1}^{\infty}$ is a convergent sequence.
- (25) The sequence $\left\{\frac{3n^2-4n+7}{6n^2+1}\right\}_{n=1}^{\infty}$ converges to 1/2.
- (26) The negation of " $\{a_n\}_{n=1}^{\infty}$ is a monotone sequence" is "there exists $n \in \mathbb{N}$ such that $a_n > a_{n+1}$ and $a_n < a_{n+1}$ ".
- (27) Every convergent sequence of rational numbers converges to a rational number.
- (28) If a sequence is not bounded below, then it diverges to $-\infty$.
- (29) If $\{a_n\}_{n=1}^{\infty}$ diverges to ∞ and $\{b_n\}_{n=1}^{\infty}$ diverges to $-\infty$, then $\{a_n+b_n\}_{n=1}^{\infty}$ converges to 0.
- (30) If $\{a_n\}_{n=1}^{\infty}$ diverges to ∞ and $\{b_n\}_{n=1}^{\infty}$ converges, then $\{a_n+b_n\}_{n=1}^{\infty}$ diverges \top to ∞ .
- (31) If $\{a_n^2\}_{n=1}^{\infty}$ converges to 1, then $\{a_n\}_{n=1}^{\infty}$ converges.