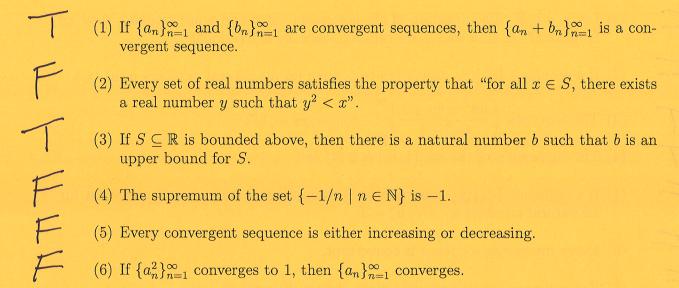
TRUE OR FALSE? JUSTIFY.

SIDE B



- (7) There is a set S of real numbers such that $\sup(S)$ exists, but $\sup(S) \notin S$.
- (8) Every set of real numbers satisfies the property that "for all $x \in S$, there exists a real number y such that $x < y^2$ ".
- (9) 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 $x \ge y^2$ ".
- (10) If $\{a_n\}_{n=1}^{\infty}$ diverges and $\{b_n\}_{n=1}^{\infty}$ converges, then $\{a_nb_n\}_{n=1}^{\infty}$ diverges.
- (11) A sequence of negative numbers can converge to zero.
- (12) A sequence of negative numbers can converge to a positive number.
- (13) Every nonempty set of real numbers has a smallest element (i.e., a minimum element).
- (14) If $\{a_n\}_{n=1}^{\infty}$ diverges to $+\infty$ and $\{b_n\}_{n=1}^{\infty}$ converges, then $\{a_n+b_n\}_{n=1}^{\infty}$ diverges to $+\infty$.
 - (15) A sequence of rational numbers can converge to an irrational number.
 - (16) A sequence of integers can converge to an irrational number.

TRUE OR FALSE? JUSTIFY.

SIDE A

F

(1) Let $x, y \in \mathbb{R}$. The negation of the statement "If x and y are rational, then xy is rational" is "If x and y are rational, then xy is irrational".

F

(2) If a sequence $\{a_n\}_{n=1}^{\infty}$ converges to 5, then for all natural numbers $n, a_n > 4$.

7

(3) The sequence $\left\{\frac{3n^2-4n+7}{6n^2+1}\right\}_{n=1}^{\infty}$ converges to 1/2.

T

(4) The supremum of the set $\{1/n \mid n \in \mathbb{N}\}$ is 1.

F

(5) 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, $a_n = L$.

F

(6) Every increasing sequence is convergent.

F

(7) If a sequence is not bounded below, then it diverges to $-\infty$.

-1

(8) If $\{a_n\}_{n=1}^{\infty}$ converges, then $\left\{\frac{a_n}{n}+2\right\}_{n=1}^{\infty}$ converges to 2.

-1

(9) 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".

F

(10) If a < b are real numbers, there is an integer $n \in \mathbb{Z}$ such that a < n < b.

K

(11) Every set of real numbers that is bounded above has a supremum.

1

(12) There is a set S of rational numbers such that $\sup(S) = 5\sqrt{2}$.

1

(13) 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.

F

(14) 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 $a_n < a_{n+1}$ ".

K

(15) If $\{a_n\}_{n=1}^{\infty}$ diverges to $+\infty$ and $\{b_n\}_{n=1}^{\infty}$ diverges to $-\infty$, then $\{a_n+b_n\}_{n=1}^{\infty}$ converges to 0.

T

(16) Every nonempty set of integers that is bounded below has a smallest element (i.e., a minimum element).