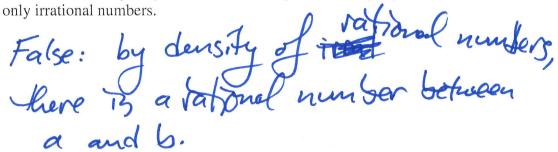
Math 325. Quiz #1

	Every nonempty subset of N has a Minimum element.
•	Write the contrapositive of the following statement: "Let a and b be integers. If a and b are both odd, then ab is odd." Let a, b be integers. If a b is even Here a is even or b is even.
(3) (Consider the statement: "There exists a natural number x such that for every natural number y , $x^2 > y$." (a) Write the negation of the statement above.
	exists a natival number x, there exists a natival number y sud that $x^2 \leq y$.
	(b) Either prove the statement above or prove its negation. Let $x \in \mathbb{N}$ be given. Take $y = x^{3}$. Since $y = x^{3}$, $y \ge x^{3}$, as required. (proof of negation)

Math 325. Quiz #2

(1)	State the Completeness Axiom of the real num	nbers.	. 1	1
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(2) True or false, and justify: There exists an open interval (a, b) with a < b that contains only irrational numbers.



(3) True or false, and justify: If a set S of real numbers has a supremum $\ell = \sup(S)$, then $\ell \in S$.

(4) Let S be a set of real numbers. Which of the following is statements is equivalent to "S is bounded above"? For which sets S is the other statement true?

(a) $\forall s \in S, \exists r \in \mathbb{R} : s \leq r$

(b) $\exists r \in \mathbb{R} : \forall s \in S, s \leq r$

(b) is bounded above.

(a) is true of every set of real runders.

(1) State the definition for a sequence $\{a_n\}_{n=1}^{\infty}$ to converge to a real number L.

For every 670, there is some NER Such that for all natural numbers on with n>N, we have 1an-LIKE.

(2) Let $S \subseteq \mathbb{R}$ be nonempty and bounded above. Let $T = \{2x \mid x \in S\}$. Prove that $\sup(T) = 2\sup(S)$.

Let $l = \sup(S)$. Given $t \in T$, write t = 2x for some $x \in S$. Then $t \le x \le l$ sine l is an open bound for S, hence $t \le 2l$. Since $t \in T$ is arbitrary, 2l is an open bound for T.

Let b be an upper bound for T, and suppose that b < 21. Then bb< 1, so by definition of supremum. Thus, thre is some XES such that IX> bb. Hun t=2X> b, with teT. This contradicts that bis an upper bound for T. We conclude that any upper bound b for the supremum of T.

Math 325. Quiz #4

(1) State the definition for a sequence $\{a_n\}_{n=1}^{\infty}$ to be *strictly increasing*.

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(2) Determine if TRUE or FALSE, and justify with a short argument or counterexample:

(a) If $\{a_n\}_{n=1}^{\infty}$ converges to 1, then there is some $N \in \mathbb{R}$ such that $a_n < 3/2$ for all natural numbers n > N.

Constitution in the second of make the property that the supplied

Tave: Tate &= 42; for all n>v, \an-1/24 => an < 1+4=36

(b) If $\{a_n\}_{n=1}^{\infty}$ converges to 1, then there is some \mathbb{R} such that $a_n = 1$ for all natural numbers n > N.

False: Take 31+4/23=1.

(c) If $\{a_n\}_{n=1}^{\infty}$ is a sequence with $0 < a_{n+1} - a_n < a_n < 25$ for all $n \in \mathbb{N}$, then $\{a_n\}_{n=1}^{\infty}$ converges.

True: an+1-an>0 => (strictly) increasing an<25 => bounded above

Any increasing bounded above square converges.