MATH 351
ADVANCED CALCULUS (REAL ANALYSIS) I
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WORKSHEET 6 SEQUENCES 1

Let $U = \mathbb{R}$

Claim 18.01: $\exists$ a well defined sequence $f(n),\ f: \mathbb{N} \longrightarrow \mathbb{R},$ which is monotonic but not bounded. Prove or disprove the claim.

Claim 18.02: $\exists$ a well defined sequence $f(n),\ f: \mathbb{N} \longrightarrow \mathbb{R},$ which is not monotonic and not bounded. Prove or disprove the claim.

Claim 18.03: $\exists$ a well defined sequence $f(n),\ f: \mathbb{N} \longrightarrow \mathbb{R},$ which is not monotonic and which is bounded. Prove or disprove the claim.

Claim 18.04: $\exists$ a well defined sequence $f(n),\ f: \mathbb{N} \longrightarrow \mathbb{R},$ which is monotonic and which is bounded. Prove or disprove the claim.

Claim 18.05: Assume that f is a well defined sequence $\ni f(n) = \frac{9}{20},\ f: \mathbb{N} \longrightarrow \mathbb{R}.$ It is the case that f is monotonic and bounded. Prove or disprove the claim.

Claim 18.06: Assume that f is a well defined sequence $\ni f(n) = \frac{2}{(n+3)(n+5)},\ f: \mathbb{N} \longrightarrow \mathbb{R}.$ It is the case that f is convergent. Prove or disprove the claim.

Claim 18.07: Assume that f is a well defined sequence $\ni f(n) = \frac{2}{(n+3)(n+5)},\ f: \mathbb{N} \longrightarrow \mathbb{R}.$ It is the case that f converges to $\frac{9}{20}$. Prove or disprove the claim.

Claim 18.08: Assume that f is a well defined sequence $\ni f(n) = \frac{1}{((n-2)^2+9)}$, $f: \mathbb{N} \longrightarrow \mathbb{R}$. It is the is the case that f is convergent. Prove or disprove the claim.

Claim 18.09: Assume that f is a well defined sequence $\ni f(n) =$, $f: \mathbb{N} \longrightarrow \mathbb{R}$. It is the is the case that f is convergent. Prove or disprove the claim.

Claim 18.10: Assume that $\{f_n\}_{n=1}^{\infty}$ is a well defined sequence that converges and $\{g_n\}_{n=1}^{\infty}$ is a well defined sequence that converges. It is the case that $\{h_n\}_{n=1}^{\infty} \ni h(n) = f(n) + g(n)$ converges. Prove or disprove the claim.

Claim 18.11: The sequence $f(n)$, $f: \mathbb{N} \longrightarrow \mathbb{R}$, is Cauchy, therefore it is bounded. Prove or disprove the claim.