MATH 351
ADVANCED CALCULUS (REAL ANALYSIS) I
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WORKSHEET 8 PART 1

Let $U = \mathbb{R}$, $D \subseteq \mathbb{R}$, $C \subseteq \mathbb{R}$

<u>Claim 19.01</u> Let f be well defined function from $\mathbb{N}$ to $\mathbb{R} \ni f(n) = n^2$ $f: \mathbb{N} \longrightarrow \mathbb{R}$.

It is the case that $\lim_{x \longrightarrow 6} f(x) = 36$. Prove or disprove the claim

<u>Claim 19.02</u> Let f be well defined function from $\mathbb{R}$ to $\mathbb{R} \ni f(x) = 2x^2 - 7x - 5$

$f: \mathbb{R} \longrightarrow \mathbb{R}$. It is the case that $\lim_{x \longrightarrow 6} f(x) = 25$. Prove or disprove the claim

<u>Claim 19.03</u> Let f be well defined function from $\mathbb{R}$ to $\mathbb{R} \ni f(x) = 3x - 5$

$f: \mathbb{R} \longrightarrow \mathbb{R}$. It is the case that $\lim_{x \longrightarrow 6} f(x) = 13$. Prove or disprove the claim.

<u>Claim 19.04</u> Let f be well defined function from $\mathbb{R}$ to $\mathbb{R} \ni f(x) = x^3$

$f: \mathbb{R} \longrightarrow \mathbb{R}$. It is the case that $\lim_{x \longrightarrow 2} f(x) = 8$. Prove or disprove the claim

<u>Claim 19.05</u> Let f be well defined function from D to $C \ni D \subseteq \mathbb{R}$, $C \subseteq \mathbb{R}$

$f: D \longrightarrow C$ and such that $\exists$ $(a, b) \subseteq D$ $a < b$.

Let g be well defined function from D to $C \ni D \subseteq \mathbb{R}$, $C \subseteq \mathbb{R}$

$g: D \longrightarrow C$ and such that $\exists$ $(a, b) \subseteq D$ $a < b$. Let $c \in (a, b)$
Let $\lim_{x \longrightarrow c} f(x)$ exist and let $\lim_{x \longrightarrow c} g(x)$ exist.

A. Define $h: D \longrightarrow C$ and such that $h = f + g$ (which is a well defined function from D to $C \ni D \subseteq \mathbb{R}$, $C \subseteq \mathbb{R}$). It is the case that $\lim_{x \longrightarrow c} h(x)$ exists and is $\lim_{x \longrightarrow c} f(x) + \lim_{x \longrightarrow c} g(x)$.
Prove or disprove the claim

B. Define $j: D \longrightarrow C$ and such that $j = f \cdot g$ (which is a well defined function from D to $C \ni D \subseteq \mathbb{R}$, $C \subseteq \mathbb{R}$). It is the case that $\lim_{x \longrightarrow c} j(x)$ exists and is $\lim_{x \longrightarrow c} (f(x) \cdot g(x))$.
Prove or disprove the claim