Mathematics Homework Sheet 7

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Problem 1

If b_n is convergent then

$$\liminf_{n\to\infty} b_n = \limsup_{n\to\infty} b_n = \lim_{n\to\infty} b_n$$

From the first inequality we have

$$\limsup_{n\to\infty}(a_n + b_n) \leq \limsup_{n\to\infty} a_n + \lim_{n\to\infty} b_n$$

And from the second inequality we have

$$\limsup_{n\to\infty}(a_n + b_n) \geq \limsup_{n\to\infty} a_n + \lim_{n\to\infty} b_n$$

Combining these two inequalities we get

$$\limsup_{n\to\infty}(a_n + b_n) = \limsup_{n\to\infty} a_n + \lim_{n\to\infty} b_n$$