

Limits¹

1. Try the following commands (at the prompt and press `Enter`):

(a) `x = sym('x')`

(b) `f = x^2`

(c) `limit(f, 2)`

(d) `limit(f, inf)`

(e) `limit(1/x, inf)`

(f) `limit(log(abs(x)), 0)`

(g) `limit(1/x, 0)`

(h) Explain what happened in each example, that is, why did it give the answer it did.

2. Use MATLAB to find the limits of the following functions at the given points:

(a) \sqrt{x} at $x = 0$ (Type as: `limit(sqrt(x), 0)`)

(b) $\sqrt{x^2 - .00001}$ at $x = 0$ (Type as: `limit(sqrt(x^2 - .00001), 0)`)

(c) \sqrt{x} at $x = -1$ (Type as: `limit(sqrt(x), -1)`)

(d) $\sin x$ at $x = \text{inf}$ (Type as: `limit(sin(x), inf)`)

(e) $\sin(1/x)$ at $x = 0$ (Type as: `limit(sin(1/x), 0)`)

(f) Explain what happened in each example.

3. Prepare a brief (< 1 page) written report answering all the questions. Use complete sentences and standard mathematical notation. Do **not** get a printout.

The user encounters usual limits, limits at infinity and infinite limits, complex limits and oscillatory functions.

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