

**Worksheet 10**  
**RETURN TO LIMITS**  
**DR. M. P. M. M. McLOUGHLIN**  
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Let the universe be  $U = \mathbb{R} \times \mathbb{R}$  (the plane).

For each write **D. N. E.** for does not exist if an answer does not exist and explain why it does not exist.

Exercise 10.1: Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be a well defined function such that  $f(x) = \sin(x)$ .

Let  $g : \mathbb{R} \rightarrow \mathbb{R}$  be a well defined function such that  $f(x) = x$ .

Consider  $h(x) = \frac{f(x)}{g(x)}$  where  $h : (-\infty, 0) \cup (0, \infty) \rightarrow \mathbb{R}$

Find  $\lim_{x \rightarrow 0} h(x)$

Exercise 10.2: Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be a well defined function such that  $f(x) = 1 - \cos(x)$ .

Let  $g : \mathbb{R} \rightarrow \mathbb{R}$  be a well defined function such that  $f(x) = x$ .

Consider  $h(x) = \frac{f(x)}{g(x)}$  where  $h : (-\infty, 0) \cup (0, \infty) \rightarrow \mathbb{R}$

Find  $\lim_{x \rightarrow 0} h(x)$