

Assignment 2 MA1123 Due Monday 19th.

1. Prove, using  $\epsilon, \delta$ , that  $\lim_{x \rightarrow 0} \sin \frac{1}{x}$  does not exist.
2. Prove, using  $\epsilon, \delta$ , that  $\lim_{x \rightarrow \frac{1}{4}} \frac{1}{x^2} = 16$
3. Prove that if  $\lim_{x \rightarrow a} f(x) = L$  then  $\lim_{x \rightarrow a} \frac{1}{f(x)} = \frac{1}{L}$
4. Prove by induction that if  $\lim_{x \rightarrow a} f_i(x) = L_i$  for  $i = 1, n$  then  $\lim_{x \rightarrow a} \sum_1^n f_i(x) = \sum_i^n L_i$
5. Let  $f(x) = 3x + b$  if  $x$  is greater than zero and  $= -7x$  if  $x$  is less than or equal to zero. What must  $b$  be for  $f(x)$  to be continuous at  $x = 0$ ?