Quiz 2 for Mathematics 223
Introductory Analysis I - Fall 2001
Material Covered: Sections 2.3, 2.4 and 2.5 of workbook and text
For: Friday, 21st September

This is a 15 minute quiz, worth 5% and marked out of 5 points.

Name (please print): _____ . **ID Number:** _____.
last first

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1. [3 points]
Consider the function $f(x) = mx + b$.

(a) The quotient difference is (circle one)
$\boldsymbol{m(x+h)+b}$ / $\boldsymbol{mx+b}$ / $\boldsymbol{mx}$ / $\boldsymbol{m}$ / $\boldsymbol{b}$

(b) The limit, $h \to 0$, of the quotient difference at $x = 2$ is (circle one)
0 / **2** / $\boldsymbol{m}$ / $\boldsymbol{h}$ / $\boldsymbol{2m+b}$

(c) The limit, $h \to 0$, of the quotient difference at $x = 3$ is (circle one)
0 / **3** / $\boldsymbol{m}$ / $\boldsymbol{h}$ / $\boldsymbol{3m+b}$

2. [2 points] Consider the function

$$f(x) = \begin{cases} \frac{1}{x} & \text{if } -1 \le x \le 1 \\ \frac{x^2+x-6}{x^2-4} & \text{if } x < -1 \text{ or if } x > 1, \end{cases}$$

Identify the five (yes, five!) discontinuities. (Hint: Sketch this function with your calculator.)

1. [3 points]

(a) $\boldsymbol{m}$
$\frac{[m(x+h)+b]-[mx+b]}{h} = m$

(b) $\boldsymbol{m}$

(c) $\boldsymbol{m}$

2. [2 points]
$x = -2, -1, 0, 1, 2$
discontinuous at $x = \pm 1$ because this is where two functions meet
discontinuous at $x = \pm 2$ because $\frac{x^2+x-6}{x^-4} = \frac{(x+3)(x-2)}{(x-2)(x+2)} = \frac{x+3}{x+2}$, so singularity at $x = 2$ and undefined at $x = -2$
discontinuous at $x = 0$ because $\frac{1}{x}$ undefined at $x = 0$