MATA31 TUT000

Quiz 3 on (A5 & A6) **Mark:_____/20**

Last Name:_____ **First Name:_____** **Student #:_____**

1. [8 points]

Give an $\varepsilon - \delta$ or $\varepsilon - N$ proof for each of the following limit statements using the following guidelines:

Write a formal algebraic statement of what you are trying to prove
Establish a connection between ε and δ. Formulate the proof.

a) $\lim_{x\to\infty} \frac{2x-1}{x+1} = 2$ We want to show that

$\forall \varepsilon > 0 \; \exists N > 0$ s.t. $x > N \Rightarrow \left|\frac{2x-1}{x+1} - 2\right| < \varepsilon$

Find

$$\left|\frac{2x-1}{x+1} - 2\right| = \left|\frac{2x-1-2x-2}{x+1}\right| = \left|\frac{-3}{x+1}\right| = \left|\frac{3}{x+1}\right| < \frac{3}{x} < \frac{3}{N}; \left(\begin{array}{c}\text{Assume}\\ x>1\end{array}\right)$$

Guess $\frac{3}{N} = \varepsilon \Rightarrow N = \frac{3}{\varepsilon}$

Proof