

26 Sept, 2013
MATH 1004D

TEST 1

1. Solve the following limits. If you know *L'Hospital's Rule*, you MAY NOT use it! [3 marks each]:

(a)

$$\lim_{x \rightarrow 4} \frac{x - 4}{x^2 - 16}$$

(b)

$$\lim_{x \rightarrow 2^+} \frac{x + 2}{x^2 - 4}$$

(c)

$$\lim_{x \rightarrow 0} \frac{\sin 4x}{2x}$$

(d)

$$\lim_{x \rightarrow \infty} \sqrt{x^2 + 1} - x$$

(e)

$$\lim_{x \rightarrow \infty} \frac{x^2 + 1}{3x^2 + 2x + 1}$$

2. Determine the points of discontinuity for $f(x)$ [6 marks].

$$f(x) = \begin{cases} x^3 + 1, & \text{if } x \neq 0 \\ 2, & \text{if } x = 0 \end{cases}$$

3. Prove that [5 marks],

$$\cos\left(\frac{3\pi}{2} - \theta\right) = -\sin(\theta)$$

4. Prove that [7 marks],

$$\frac{1 + \cot x}{1 + \tan x} = \cot x$$

5. Prove that [7 marks],

$$\frac{1}{\tan x + \cot x} = \sin x \cos x$$