MATH2132 Test1 **September 26, 2013** **60 minutes**

Student Name - **Student Number -**

Values

6 **1.** Find the limit for the following sequence of functions on the interval $0 \leq x \leq 5$, if it exists. Show your reasoning and all calculations.

$$\left\{ \frac{3^{n+1}x^4 + 2^n x^2 + 11}{3^n x^2 + 5x + 55} \right\}$$

12 **2.** Determine whether the following series converge or diverge. If a series converges, find its sum. Justify your conclusions.

(a) $\displaystyle\sum_{n=2}^{\infty} \frac{17^{n+2}}{4^{2n+3}}$ (b) $\displaystyle\sum_{n=1}^{\infty} (-1)^n \left(\frac{n+2}{14n} \right)^3$

10 **3.** (a) Find all values of the constant a for which the series

$$\sum_{n=2}^{\infty} \frac{a^{2n} + 3}{5^{n+1}}$$

converges.

(b) Find the sum of the series for the values of a for which the series converges.

12 **4.** Prove that the Taylor series for e^{3x} about $x = 1$ converges to e^{3x} for all $x \geq 1$.