MATH2132 Test1 **February 7, 2008** **60 minutes**

Values

4 1. Find the limit of the sequence of functions $\{f_n(x)\}$ on the interval $0 \le x \le 5$, if it exists. Justify your answer.

$$f_n(x) = \frac{2n^2x + nx}{n^2 + 1}$$

5 2. Find the Taylor series about $x = -2$ for the function $f(x) = e^{2x+1}$. Include its interval of convergence.

9 3. Find the open interval of convergence for the power series

$$\sum_{n=3}^{\infty} \frac{(-1)^n 2^n}{n^3}(x+1)^{3n+1}.$$

Express your answer in the form $a < x < b$ for appropriate values of a and b.

10 4. Find the Maclaurin series for the function $f(x) = \frac{x}{(2+x)^2}$. What is the interval of convergence of the series?

12 5. Find the Maclaurin series for the function $f(x) = \frac{1}{\sqrt[3]{8+3x}}$. Find the radius of convergence of the series.

Answers by Dawit y. (ydawit@yahoo.com)

1) $2x$ 2) $\sum_{n=0}^{\infty} \frac{e^{-3}2^n(x+2)^n}{n!}$, $-\infty < x < \infty$, 3) $-(1+\sqrt[3]{1/2}) < x < \sqrt[3]{1/2} - 1$

4) $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} n}{2^{n+1}} x^n$, $-2 < x < 2$, 5) $\frac{1}{2} + \sum_{n=1}^{\infty} \frac{(-1)^n [1 \cdot 4 \cdot 7 \cdots (3n-2)]}{2^{3n+1}\, n!} x^n$

, $-8/3 < x < 8/3$