Dawson College: **Calculus II**: 201-203-DW-S03: Fall 2009

Name: _____
Student ID: _____

Test 4

This test is graded out of 44 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(5 marks)* Find the general solution of the following differential equation.

$$y' = \frac{y^2 x e^{x^2}}{1+y^2}$$

Question 2. *(5 marks)* Find the solution to the following following initial value problem:

$$y' = 5xy - 3x$$

where $y(0) = 1$.

Question 3. *(5 marks)* Find the third Taylor Polynomial of $f(x) = xe^{-3x} + \cos 2x$ at $x = 0$

Question 4. Determine the convergence or divergence of the following sequences.

a. *(2 marks)*

$$a_n = \frac{\ln n}{n}$$

b. *(2 marks)*

$$a_n = \frac{2n^2 - n - 1}{3n^2 + 3n + 101}$$

Question 5. *(5 marks)* Determine if the following series converges or diverges. If it converges, find its sum.

$$\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$$

Question 6. *(5 marks)* Determine if the following series converges or diverges. If it converges, find its sum.

$$\sum_{n=1}^{\infty} \frac{5^n + 1}{7^{n+1}}$$

Question 7. *(5 marks)* Determine if the following series converges or diverges, justify your answer and state the test used.

$$\sum_{n=1}^{\infty} \frac{e^{-\ln n}}{n}$$

Question 8. *(5 marks)* Determine if the following series converges or diverges, justify your answer and state the test used.

$$\sum_{n=1}^{\infty} \frac{n}{\sqrt{2n^2+1}}$$

Question 9. *(5 marks)* Determine if the following series converges or diverges, justify your answer and state the test used.

$$\sum_{n=0}^{\infty} \frac{n}{\sqrt{n^5+1}}$$

Bonus. *(3 marks)* Determine if the following series converges or diverges, justify your answer and state the test used.

$$\sum_{n=0}^{\infty} \frac{n}{e^n}$$