MATH2132 Test 2 **May 30, 2012** **60 minutes**

Values

15 **1.** Find the Taylor series about $x = 1$ for the function $\sqrt{2 + 4x}$. Use a method that guarantees that the Maclaurin series converges to the function. Express your answer in sigma notation, simplified as much as possible. What is the open of convergence of the series written in the form $a < x < b$?

10 **2.** Find the Maclaurin series for the function $x^4 \ln(x + 2)$. Use a method that guarantees that the Maclaurin series converges to the function. Express your answer in sigma notation, simplified as much as possible. What is the radius of convergence of the series?

9 **3.** Find in explicit form the solution of the initial value problem

$$(x^2 - 2x + 1)\frac{dy}{dx} = xy^2 + x, \qquad y(2) = 1.$$

6 **4.** Find a one-parameter family of solutions of the differential equation

$$x\frac{dy}{dx} = 2y + x^3 \sin 2x.$$

Are there any singular solutions of your family?