MATH2132 Test 2 **June 12, 2013** **60 minutes**

Values

15 **1.** Find the Taylor series about $x = 2$ for the function $(x+5)^{1/3}$. Use a method that guarantees that the Taylor series converges to the function. Express your answer in sigma notation, simplified as much as possible. What is the open interval of convergence of the series written in the form $a < x < b$?

10 **2.** Find the sum of the series $\displaystyle\sum_{n=2}^{\infty} \frac{(n+2)}{3^n} x^n$.

9 **3.** (a) Find a series representation for the definite integral

$$\int_0^1 \frac{x - \sin x}{x^3} dx.$$

(b) Explain how you would obtain an approximation to the integral accurate to 5 decimal places. Do **NOT** attempt to find the approximation; just explain how to do it.

6 **4.** (a) Find, in explicit form, a one-parameter family of solutions of the differential equation

$$\frac{dy}{dx} = \frac{xy}{2(x-1)}.$$

(b) Are there any singular solutions of your family?