Term Test 2

DATE: March 12, 2013
TIME: 70 minutes
COURSE: MATH 2132
EXAMINER: G.I. Moghaddam & M. Virgilio

NAME:_____

STUDENT # : _____

❑ A01 G.I. Moghaddam ❑ A02 M. Virgilio

Q1	Q2	Q3	Q4	Q5	Total (out of 50)

[8] 1. Use the binomial expansion to find only the first three nonzero terms of the Taylor series about 1 of $f(x) = \sqrt{x} + \dfrac{1}{\sqrt{x}}$. Simplify your answer.
(You are **not** asked to find all the terms of the Taylor series. No mark will be given for any other method)

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[8] 2. Evaluate the following limit using infinite series.

$$\lim_{x\to 0} \frac{1}{x^3}\left[\sqrt[3]{(1+x^3)^2} + x^3 - 1\right]$$

(You are not allowed to use any other method.)

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[8] 3. Find the sum and the open interval of convergence of the series $\sum_{n=1}^{\infty} \left(\frac{n+3}{n!} \right) x^{n+2}$.

[11] 4. Find, in **explicit** form , a one parameter family of solutions for the differential equation

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

[15] 5. Find a 2 -parameter family of solutions for the differential equation

$$2\sqrt{x}\, y'' \;=\; (y')^2 \,.$$

Is there any singular solution? Explain.

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ANSWERS

Q1 $f(x) = 2 + \frac{1}{4}(x-1)^2 - \frac{1}{4}(x-1)^3 + \cdots$

Q2 $\frac{5}{3}$

Q3 $S(x) = x^2((x+3)e^x - 3)$

Q4 $y = -\frac{\cos 2x}{2xe^x} + \frac{C}{xe^x}$.

Q5 $y = -2(\sqrt{x}+C)+2C\ln|\sqrt{x}+C|+E$. Also $y = D$ is a singular solution.