Name: _____

MATHEMATICS SPECIALIST 3CD

SEMESTER 1 2010

TEST 3

	Questions	Reading Time	Working Time	Marks	Score
Calculator Free	**1 – 2**	**3 minutes**	**20 minutes**	**15**	
Calculator Assumed	3 - 5	5 minutes	35 minutes	28	
Total				43	

1. [5 marks]

Prove the following: $\frac{1+\sin A}{1-\sin A} = 2\tan^2 A + 1 + \frac{2\tan A}{\cos A}$

2. [10 marks]

Find the equation of the tangents to the curve $x^2 + y^2 = 5x$ where the line y = x – 2 intersects it.

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3. [3 marks]

Find a counter example to the claim: 'A quadratic function of x is a function in which the highest power of x is 2'.

4. [4, 3, 4 marks]

(a) If $x^3 + y^3 - 9xy = 0$, determine $\frac{dy}{dx}$ at (3, 0).

(b) Find $\frac{dy}{dx}$ if $x \sin y = 2xy$

(c) If $x = e^t \cos t$ and $y = \sin t + \cos t$, determine $\frac{dy}{dx}$ in its simplest form.

5. [2, 3, 4, 5 marks]

(a) Determine $\int \cos^2(4x)\, dx$

(b) Determine $\int \frac{x}{\sqrt{1-2x}}\,dx$ (Let $u = 1-2x$)

(c) Evaluate $\int_0^1 \frac{x}{\sqrt{4-x^2}}\,dx$ by substituting $x = 2\sin\theta$

(d) The figure shows part of the curve y = sin x. Calculate the **exact** area of the shaded region.