

DTEMS PAST PAPERS

TECHNICAL STUDIES

# Sir Arthur Lewis Community College

Division of Technical Education and Management Studies

RESERVE

05 MAY

EXAMINATION : MAY 2014 - FINAL EXAMINATION

COURSE TITLE : CALCULUS II

COURSE CODE : MAT 216

TUTORS : MR. VERNE CAZAUBON

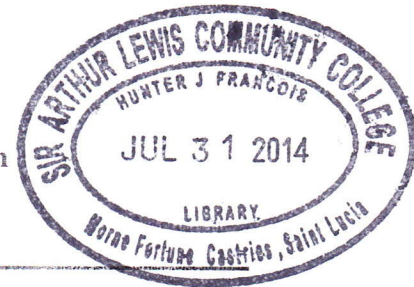
TIME : 2 HOURS

DATE : Wednesday 14<sup>th</sup> May, 2014

INVIGILATORS : V. Etienne, M. Sifflet; F. Joseph

ROOMS : CEHI-1R-02

# C 41



## INSTRUCTIONS:

Answer all questions on this paper.

Answer all questions on the foolscaps provided.

Show all necessary working.

**You are permitted to use nonprogrammable calculators.**

# SIR ARTHUR LEWIS COMMUNITY COLLEGE

Division of Technical Education and Management Studies

MAT 216: Calculus II Final

Instructions: Answer all questions. Show all working.

1. Find the equation of the tangent to the graph  $x = t^2$ ;  $y = 4t$  at the point where  $t = -1$ . [7]

2. Find the equation of the normal to the curve  $x^2 + y^2 = 10$  at the point (1,3). [5]

3. Differentiate the following:

a.  $\arctan(\ln|6x|)$  [4]

b.  $x^2 \coth 3x$  [5]

4. Evaluate:  $\sec(\arctan \sqrt{3})$ . [5]

5. Show that:  $\sin(\arccos x) = \sqrt{1 - x^2}$ . [3]

6. Using the result from question 5 above, find  $\frac{d}{dx}(\arccos x)$ . [4]

7. Find:

a.  $\int \frac{5x^{4/3} - 10\sqrt[3]{x} \cos x}{\sqrt[3]{x}} dx$  [3]

b.  $\int \sin^2 x \cos^3 x dx$  [6]

c.  $\int \sin 5x \sin 4x dx$  [4]

8. Write  $\frac{x^2-1}{x^2(2x+1)}$  in the form  $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{2x+1}$  solving for A, B and C. [6]

9. Using the result from question 8 above, find  $\int \frac{x^2-1}{x^2(2x+1)} dx$ . [5]

$$\frac{d}{dx}(\sinh x) = \cosh x$$

$$\frac{d}{dx}(\cosh x) = \sinh x$$

$$\frac{d}{dx}(\tanh x) = \operatorname{sech}^2 x$$

$$\frac{d}{dx}(\operatorname{cosech} x) = -\operatorname{cosech} x \coth x$$

$$\frac{d}{dx}(\operatorname{sech} x) = -\operatorname{sech} x \tanh x$$

$$\frac{d}{dx}(\coth x) = -\operatorname{cosech}^2 x$$

$$\frac{d}{dx}(\sin x) = \cos x$$

$$\frac{d}{dx}(\cos x) = -\sin x$$

$$\frac{d}{dx}(\tan x) = \sec^2 x$$

$$\frac{d}{dx}(\operatorname{cosec} x) = -\operatorname{cosec} x \cot x$$

$$\frac{d}{dx}(\sec x) = \sec x \tan x$$

$$\frac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$$

$$\frac{d}{dx}(\operatorname{arcsinh} x) = \frac{1}{\sqrt{1+x^2}}$$

$$\frac{d}{dx}(\operatorname{arccosh} x) = \frac{1}{\sqrt{x^2-1}}$$

$$\frac{d}{dx}(\operatorname{arctanh} x) = \frac{1}{1-x^2}$$

$$\frac{d}{dx}(\operatorname{arccosech} x) = \frac{-1}{x\sqrt{1+x^2}}$$

$$\frac{d}{dx}(\operatorname{arcsech} x) = \frac{-1}{x\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\operatorname{arccoth} x) = \frac{1}{1-x^2}$$

$$\frac{d}{dx}(\operatorname{arcsin} x) = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\operatorname{arccos} x) = \frac{-1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx}(\operatorname{arctan} x) = \frac{1}{1+x^2}$$

$$\frac{d}{dx}(\operatorname{arccosec} x) = \frac{-1}{|x|\sqrt{x^2-1}}$$

$$\frac{d}{dx}(\operatorname{arcsec} x) = \frac{1}{|x|\sqrt{x^2-1}}$$

$$\frac{d}{dx}(\operatorname{arccot} x) = \frac{-1}{1+x^2}$$

$$2 \sin A \cos B = \sin(A+B) + \sin(A-B)$$

$$2 \cos A \cos B = \cos(A-B) + \cos(A+B)$$

$$2 \sin A \sin B = \cos(A-B) - \cos(A+B)$$

$$\sin^2 A + \cos^2 A = 1$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$\cos 2A = 2 \cos^2 A - 1$$

$$\cos 2A = 1 - 2 \sin^2 A$$

$$\sin 2A = 2 \sin A \cos A$$