DTEMS PAST PAPERS

TECHNICAL STUDIES

Sir Arthur Lewis Community College

Division of Technical Education and Management Studies

EXAMINATION	:	MAY 2014 - FINAL EXAMINATION
COURSE TITLE	:	CALCULUS II
COURSE CODE	:	MAT 216
TUTORS	:	MR. VERNE CAZAUBON
TIME	:	2 HOURS
DATE	:	Wednesday 14th May, 2014
INVIGILATORS	:	**V. Etienne, M. Sifflet; F. Joseph**
ROOMS	:	CEHI-1R-02

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

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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]

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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