College of Industrial Technology

King Mongkut's University of Technology North Bangkok

เลขที่นั่งสอบ

Final Examination of Semester 1 **Year:** 2013

Subject: 394171 Mathematics I **Section:** 15-16

Date: 25 September 2013 **Time:** 13.00-16.00

Name: _____ ID: _____ Class: _____

Instructions:

1. Cheating will result in failure of all classes registered for the current semester. Students who are caught cheating will also be denied registering for the following semester.
2. No documents are allowed to be taken out of the examination room.
3. Textbook are **NOT** allowed in the examination.
4. Calculators are allowed.
5. Electronic communication devices are **NOT** allowed in the examination room.
6. The examination has 7 pages (including this page), 12 questions and a total score of 120 marks.
7. Write solutions and answers on the examination sheets.

Question 1. Find the exact value $\arcsin(-\frac{1}{2}) + \arccos\frac{\sqrt{2}}{2} - \arctan(-1)$ (10 marks)

Question 2. Find the exact value $\tan(\arcsin\frac{2}{3}) + \cos(\arcsin(-\frac{4}{5})) - \cot(\arctan(\frac{5}{8}))$

(10 marks)

Question 3. To prove the identity $(x\sin\alpha + y\cos\alpha)^2 + (x\sin\alpha - y\cos\alpha)^2 = x^2 + y^2$ (10 marks)

Question 4. Show that $\dfrac{\sin(x+y)}{\sin(x-y)} = \dfrac{\tan x + \tan y}{\tan x - \tan y}$ (10 marks)

Question 5. Solve algebraically for exact solution $\cos 2x + \cos 4x = 0$ (10 marks)

Question 6 Find the area of a regular nonagon (9 sides) circumscribed about a circle of radius 10 inches. (10 marks)

Question 7 Express the function $y = 3\cos 2x - 2\sin 2x$ as a sinusoid in the form $y = a\sin(bx + c)$. (10 marks)

Question 8 Given a relation $r = \{(x, y) \mid x^2 = y^2 + 9\}$, find an inverse relation of r and $D_{r^{-1}}$, $R_{r^{-1}}$. (10 marks)

Question 9 Given $f(x) = 2x + 4$ and $g(f(x)) = 6x - 4$, find the function $g^{-1}(x)$.
(10 marks)

Question 10 given $f^{-1}(x) = \frac{ex}{x+3}$ and $(f \circ g)(x-4) = 2x + 5$ find $g(x)$ and $g^{-1}(1)$
(10 marks)

Question 11 Given a relation $r = \{(x,y) \mid y \geq -x^2 \text{ and } y \leq |2x|-3\}$, sketch graph of the relation and find its domain and range. (10 marks)

Question 12 Sketch the quadratic equation $f(x) = -3x^2 - 6x + 4$ and find domain and range. (10 marks)