2012 年度日本政府（文部科学省）奨学金留学生選考試験

QUALIFYING EXAMINATION FOR APPLICANTS FOR JAPANESE

GOVERNMENT (MONBUKAGAKUSHO) SCHOLARSHIPS 2012

学科試験　　問題

EXAMINATION QUESTIONS

（学部留学生）

UNDERGRADUATE STUDENTS

数　　学　（A）

MATHEMATICS(A)

注意　☆試験時間は 60 分。

PLEASE NOTE : THE TEST PERIOD IS 60 MINUTES.

MATHEMATICS (A)

Nationality		No.			Marks	
Name	(Please print full name,underlining family name)					

1. Fill in the blanks with the correct numbers.

(1) The equation of the line which passes through $(-3, 2)$ and is orthognal to the line $3x - 4y - 12 = 0$ is given by

(a) ☐ $x+$ (b) ☐ $y + 1 = 0$.

(2) If $x = \dfrac{\sqrt{5} - 1}{2}$, then $x^3 + x + 1 = $ ☐ .

(3) If $\dfrac{2^x - 2^{-x}}{2^x + 2^{-x}} = \dfrac{1}{3}$, then $x = $ ☐ .

(4) If $\sin x + \cos x = \dfrac{4}{3}$ $(0 \leq x \leq \dfrac{\pi}{4})$, then $\sin x - \cos x = $ ☐ .

(5) Let $f(x) = -px + 2$ and $g(x) = 5x + 1$. If $f(g(x)) = g(f(x))$, then

$p = $ ☐ .

2. Consider a triangle $\triangle ABC$ with $AB = 4$, $BC = 5$ and $CA = 3$. Let D be the point of intersection of the bisector of the angle $\angle A$ and the edge BC. Find the length of AD.

3. Let n be an odd integer ≥ 5.

(1) Find the number of pairs (x, y) of positive integers which satisfy the equation $x + 2y = n$.

(2) Find the number of triples (x, y, z) of positive integers which satisfy the equation $x + y + 2z = n$.