2008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 2008

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.

(2008)

MATHEMATICS (A)

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

1 Fill in the blanks with the correct numbers.

(1) When the parabola $y = x^2 - a(x+1) + 3$ intersects the x-axis at one point,

then $a =$ ① ____ or ② ____.

(2) The solution of the inequality $\log_2(x+1) \leqq 3$ is

① ____ $< x \leqq$ ② ____.

(3) Let $\triangle ABC$ be the isosceles triangle with sides $AB = AC = 3$ and $BC = 4$.

Then the radius of the inscribed circle of $\triangle ABC$ is

____.

(4) The maximal value of $f(\theta) = \sin\theta - \sqrt{3}\cos\theta$ $(0 \leqq \theta < 360^\circ)$ is

____.

(5) If $x + y = 3$ and $x^2 + y^2 = 5$, then $x^3 + y^3 =$ ____.

2 Let a quadrilateral $ABCD$ be inscribed in a circle such that $AB = 5$, $BC = 3$, $CD = 2$ and $\angle B = 60^\circ$.

(1) Find the length of AC.

(2) Find the length of DA.

3 Let $x > 0$, $y > 0$, $xy = 8$ and $P = 2(\log_2 x)^2 + (\log_2 y)^2$.

(1) Let $X = \log_2 x$. Express P in term of X.

(2) Find the minimum of P.