## 2013 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 2013

学科試験 問題
EXAMINATION QUESTIONS

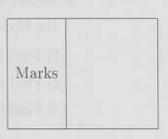
(学部留学生) UNDERGRADUATE STUDENTS

数 学(B)
MATHEMATICS(B)

注意 ☆試験時間は60分。 PLEASE NOTE: THE TEST PERIOD IS **60 MINUTES**.

## MATHEMATICS(B) (2013)

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



1. Fill in the blanks with the correct answers.

The minimum of the function $f(x) = (2 + \sin x)(5 - \sin x)$ is
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(2) If 
$$(2k+1)x - (k-2)y + 3k - 1 = 0$$
 for every  $k$ , then  $x =$  and  $y =$  (ii)

(4) Let 
$$a$$
 and  $b$  be rational numbers. If  $\frac{(\sqrt{3}+\sqrt{2})^3}{\sqrt{3}-\sqrt{2}}=a+b\sqrt{6}$ , then  $a= (i)$  and  $b= (ii)$ .

(5) If 
$$3^x = 2^y = 5$$
, then  $\frac{1}{x} + \frac{1}{y} = \log_5$ 

2. Consider the function $F(x)$	$= \int_{-\infty}^{x} f(t)dt = x^3 - 2x^2 + x - a$	$(a \neq 0)$ . Fill in
the blanks with the answer	s to the following questions.	

- (1) Find a.
- (2) Find the range of x where F(x) > 0.
- (3) Find the area of the region surrounded by the x-axis and the graph of f(x).

(1)	- 7-4	(2)	(3)	
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3. Fill in the blanks with the answers to the following questions.

(1) Find the range of m such that the equation  $|x^2-3x+2|=mx$  has 4 distinct real solutions  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ .

(2) Express the value of  $s(m) = \frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\gamma^2} + \frac{1}{\delta^2}$  in terms of m. (3) When m varies as in (1), find the range of s(m).

(1)	(2)	

(3)	
(0)	