2015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 2015

学科試験　問題

EXAMINATION QUESTIONS

（専修学校留学生）

SPECIAL TRAINING COLLEGE STUDENTS

数　学

MATHEMATICS

注意☆試験時間は６０分。

PLEASE NOTE : THE TEST PERIOD IS　６０ MINUTES.

MATHEMATICS

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

Marks

answer sheet

question		answer
1	(1)	① ②
	(2)	
	(3)	
	(4)	① ②
	(5)	
	(6)	
	(7)	① ②
	(8)	① ②
	(9)	① ②
	(10)	① ② ③
2	(1)	① ② ③
	(2)	① ②
	(3)	① ②
		③ ④
3	(1)	
	(2)	① ② ③
	(3)	

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

Note that all the answers should be written on the answer sheet.

1. Fill in the following blanks with the correct numbers.

(1) When $a > 0$, then what is the range of x that satisfies the following inequality:

$$ax^2 - 3ax + 2a < 0$$

$\boxed{①}$ $< x <$ $\boxed{②}$.

(2) If $4^{3x-1} - 2^{5x-4} = 0$, then $x = \boxed{}$.

(3) $10^{\log_{10} 5} = \boxed{}$.

(4) When α and β are the solutions of the quadratic equation $x^2 - 5x + 3 = 0$,

then $\alpha^2 + \beta^2 = \boxed{①}$, $(\alpha - \beta)^2 = \boxed{②}$.

(5) When $|\vec{a}| = 1$, $|\vec{b}| = 2$, $|\vec{a} - \vec{b}| = \sqrt{7}$, then the degree measure of the angle between $\vec{a}$ and $\vec{b}$ is $\boxed{}$ ° .

(6) When $\triangle ABC$ is a triangle where $\angle A = 30°$, then $\sin(\angle B + \angle C)$ is $\boxed{}$.

(7) How many multiples of 3 are there among integers from 100 to 200?

The answer is $\boxed{①}$, and the sum of those multiples of 3 is $\boxed{②}$.

(8) When $x^3 + ax^2 + bx + 5$ is divisible by $x - 1$ and has a remainder of 5 when divided by $x - 2$, then $a = \boxed{①}$, $b = \boxed{②}$.

(9) Let $f(x) = |x^2 - 1|$. Then $f(0) = \boxed{①}$, $\int_0^2 f(x)dx = \boxed{②}$.

(10) Assume that a, b and c are consecutive terms of arithmetic progression

$(a < b < c)$. If $a + b + c = 24$ and $abc = 440$, then

$a = \boxed{①}$, $b = \boxed{②}$, $c = \boxed{③}$.

2. On the plane xy, there are four points ; O $(0,0)$, A $(0,3)$, B $(0,-3)$, C $(4,0)$.

Fill in the following blanks with the correct numbers.

(1) The equation of the straight line AC is $\boxed{①}\ x + \boxed{②}\ y - \boxed{③} = 0$

(2) The coordinates of the circumcenter of $\triangle ABC$ are $\left(\dfrac{\boxed{①}}{8},\ \boxed{②} \right)$.

(3) When point D is the intersection of bisector of $\angle ABC$ and $x-$axis, then

OD $:$ DC $= \boxed{①} : \boxed{②}$ and the coordinates of the inner center of $\triangle ABC$

are $\left(\dfrac{\boxed{③}}{2},\ \boxed{④} \right)$.

3. The line (a) ; $y = x + k$ (k is a constant) is tangent to both the

parabola (b) ; $y = x^2 - 5x + 7$

and the parabola (c) ; $y = x^2 + 3x - 1$.

Point P is the point of tangency of the line (a) and the parabola (b), point Q is the point of tangency of the line (a) and the parabola (c) and point R is the intersection of the parabola (b) and the parabola (c).

Fill in the following blanks with the correct numbers.

(1) The constant $k = \boxed{}$.

(2) The $x-$coordinate of the point P is $\boxed{①}$, the $x-$coordinate of the point Q is $\boxed{②}$ and the $x-$coordinate of the point R is $\boxed{③}$.

(3) The area surrounded by the line (a), the parabola (b) and the parabola (c) is $\boxed{}$.