2019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 (MEXT) SCHOLARSHIPS 2019

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 (2019)

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

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

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

(1) Find the range of x that satisfies the following inequality

$|x+3|<4x$. The answer is $\boxed{}$.

(2) The number of solutions (x,y,z) of the equation $x+y+z=4$, where x, y and z are zero or positive integers is $\boxed{}$.

(3) On the plane xy, there are two points ; O(0,0), A(6,8). The equation of the circle with a diameter of the line segment OA is $(x-\boxed{①})^2+(y-\boxed{②})^2=\boxed{③}^2$.

(4) $\log_4 9=\log_2\boxed{①}$, $\log_9 4=\log_3\boxed{②}$,

hence $(\log_2 3+\log_4 9)(\log_3 2+\log_9 4)=\boxed{③}$.

(5) $\sqrt[6]{25}\times\sqrt[3]{25}\div\sqrt{5}=\boxed{}$.

(6) Let the sequence $\{a_n\}(n=1,2,3,\cdots)$ be a geometric progression satisfying $a_1+a_2+a_3=14$, $a_2+a_3+a_4=-42$. When we denote the first term of $\{a_n\}$ by a, and the common ratio by r, we have $a=\boxed{①}$, $r=\boxed{②}$.

(7) Let $\overrightarrow{a}=(1,0,-1)$, $\overrightarrow{b}=(-2,2,1)$, $\overrightarrow{c}=(x,y,z)$ $(x>0)$ and $|\overrightarrow{c}|$=3. When $\overrightarrow{c}$ is perpendicular to both $\overrightarrow{a}$ and $\overrightarrow{b}$, then $x=\boxed{①}$, $y=\boxed{②}$, $z=\boxed{③}$.

(8) Let M denote the midpoint of side BC of a triangle ABC.

When BC=8, CA=4, AB=6, then cos∠ABC= $\boxed{①}$, AM= $\boxed{②}$.

(9) The equation of the tangent to the curve $f(x)=-x^2+x+2$ at the point (0,2) is $y=\boxed{①}$, and the area of the region bounded by the curve $f(x)$, the tangent and the x-axis is $\boxed{②}$.

2. A triangle ABC on a plane satisfies AC＝BC and ∠ACB＝90°. DC＝1, ∠AHD＝90° and ∠ADC＝60°. Fill in the following blanks with the correct numbers.

(1) The radius of the circumscribed circle of △ADC＝$\boxed{}$.

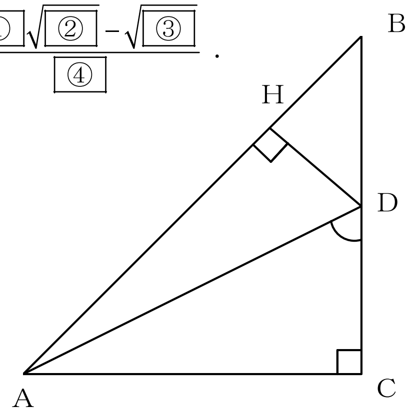
(2) The radius of the circumscribed circle of △ABC＝$\boxed{}$.

(3) The radius of the inscribed circle of △ABC＝$\dfrac{\boxed{①}\sqrt{\boxed{②}}-\sqrt{\boxed{③}}}{\boxed{④}}$.

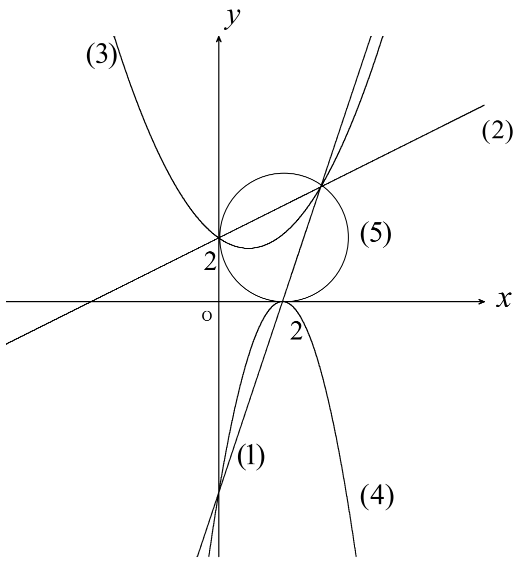
(4) DH＝$\dfrac{\sqrt{\boxed{①}}-\sqrt{\boxed{②}}}{\boxed{③}}$.

(5) sin ∠DAH＝$\dfrac{\sqrt{\boxed{①}}-\sqrt{\boxed{②}}}{\boxed{③}}$.

(6) cos ∠DAH＝$\dfrac{\sqrt{\boxed{①}}+\sqrt{\boxed{②}}}{\boxed{③}}$.



3. On the plane xy, there are two straight lines ((1) and (2)), two parabolas ((3) and (4)) and a circle (5) as shown in a lower figure. Choose the correct equation from ①〜⑮ to satisfy each graph and fill in the blank with the number.



① $x+3y+6=0$	② $4x-y-4=0$	③ $x^2+4x+y^2+4y+4=0$
④ $5x^2-30y+8x+60=0$	⑤ $x-3y+6=0$	⑥ $x^2+y+4x+4=0$
⑦ $x^2-4x+y^2-4y+4=0$	⑧ $5x^2-30y-8x-60=0$	⑨ $2x-y-4=0$
⑩ $x^2+y-4x-4=0$	⑪ $x^2-4x-y^2-4y+4=0$	⑫ $x-3y-6=0$
⑬ $5x^2-30y-8x+60=0$	⑭ $2x+y+4=0$	⑮ $x^2+y-4x+4=0$