2007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 2007

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.

(2007)

MATHEMATICS (A)

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

Marks	

1 Fill in the blanks with the correct numbers.

(1) The solution of the inequality $2x^2-3x-2 \leqq 0$ is

$$\boxed{①} \leqq x \leqq \boxed{②}.$$

(2) The sides of $\triangle ABC$ are $AB=6$, $BC=4$ and $CA=5$.

Then $\cos \angle A = \boxed{①}$ and $\sin \angle A = \boxed{②}$.

(3) If $2^x 4^y = 32$ and $\dfrac{3^x}{9^y} = 3$, then $\dfrac{5^x}{125^y} = \boxed{}$.

(4) $5\log_2\sqrt{2} - \dfrac{1}{2}\log_2 3 + \log_2 \dfrac{\sqrt{3}}{2} = \boxed{}$.

(5) If $x+y=5$, $xy=1$ and $x>y$, then $\dfrac{\sqrt{x}+\sqrt{y}}{\sqrt{x}-\sqrt{y}} = \boxed{}$.

2 Let $\triangle ABC$ be a right angled triangle such that $\angle A = 90°$, $AB = AC$ and let M be the mid point of the side AC. Take the point P on the side BC so that AP is vertical to BM. Let H be the intersection point of AP and BM.

(1) Find the ratio of the areas of the two triangles $\triangle ABH : \triangle AHM$.

(2) Find the ratio $BP : PC$.

3 Let $\{a_n\}$ be the sequence defined by

$$a_n = \left[\frac{n^2+8n+10}{n+9}\right],$$

where $[x]$ is the largest integer that does not exceed x.

Find the value of $\sum_{n=1}^{30} a_n$.