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　（B）

MATHEMATICS (B)

注意　☆試験時間は60分。

PLEASE NOTE : THE TEST PERIOD IS 60 MINUTES.

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

1 Fill in the blanks with the correct numbers.

(1) If $\sqrt{6+\sqrt{a}}+\sqrt{6-\sqrt{a}}=\sqrt{14}$, then $a=\boxed{}$.

(2) The remainder of the divison of x^3 by x^2-x+1 is $\boxed{①}$ and that of

x^{2007} by x^2-x+1 is $\boxed{②}$.

(3) The solution of the inequality $\log_2(x+1)\le 3$ is { $\boxed{①} < x \le \boxed{②}$ }.

(4) Let A be a point on the curve $C: x^2+y^2-2x-4=0$. If the tangent line to C

at A passes through $P(4,3)$, then the length of $\overline{AP}$ is $\boxed{}$.

(5) Let x, y be two natural numbers such that $x < y$, $x+y=96$, and the greatest

common divisor of x and y is 16. Then $x=\boxed{①}$ and $y=\boxed{②}$.

2 Let $\triangle ABC$ be the triangle with $AB = 5$, $BC = 4$, and $\angle B = 60°$.

(1) Find the length of AC.

(2) Find the radius of the circumcircle of $\triangle ABC$.
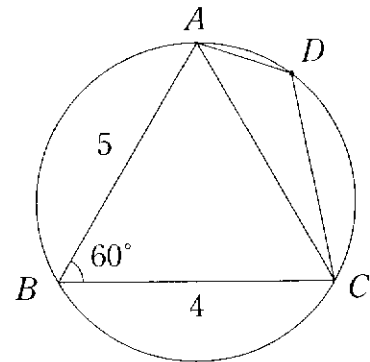
(3) Let D be a point on the minor arc of the circumcircle bounded by A and C. Find the maximum value of the area of the quadrilateral $ABCD$.

3 Let $F(x) = \int_1^x (3t^3 - x^2 t) \, dt$.

(1) Calculate $F'(x)$.

(2) Find the minimum of $F(x)$.

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