Admission/Placement Examination 2011/2012 – MATHEMATICS (Paper 1)

Part I：Multiple-choice

1. Find the maximum of $y = \sqrt{3}\sin x + \cos x$.

(A)1 (B)2 (C) 4 (D) $\sqrt{2}$

2. The necessary and sufficient condition for $a^2 > b^2$ is

（A）$|a| > |b|$ （B）$a > b$ (C) $a < b$ (D) $a > -b$

3. Find the increasing function

(A) $y = |x|$ (B) $y = x^2$ (C) $y = x^3$ (D) $y = x^4$

4.. If the line $x + y - 2 = 0$ is tangent to the circle $x^2 + y^2 = a$, then $a =$

(A) 4 (B)2 (C) $\sqrt{2}$ (D)1

5.There are10 multiple-choice problems in a exam paper，and 4 items to be chosen in each problem. A student has finished 6 problems and decides to solve the 4 problems left by guess. What is the probability of the event that the student gives 3 correct answers among the 4 problems?

(A) $\frac{1}{16}$ (B) $\frac{1}{32}$ (C) $\frac{1}{64}$ (D) $\frac{3}{64}$

6. Which one is correct, known $a = \lg\frac{5}{3}$, $b = \lg\frac{3}{5}$.

（A）one among b and a is the negative of another.

(B) one among b and a is the reciprocal of another.

(C) $ab = 0$

(D) $\frac{a}{b} = \frac{9}{25}$

7. Given $|x-3| + (x-y+1)^2 = 0$, $\sqrt{x^2y + xy^2 + \frac{y^3}{4}} =$

（A）10 （B）100 （C）81 （D）9

8. An arithmetic sequence consists of 5 items. The sum of the first two items is 7，the sum of the last two items is 737. Its middle term is

（A）10 （B）11 （C）12 （D）9

9.The solution of the inequality $\log_{\frac{1}{3}}(4x - x^2) < -1$ is

（A）(1,3) （B）(0,4) （C）(1,4) （D）(0,3)

10. Suppose the sets $A = \{0,2,a\}$, $B = \{0,a^2\}$. If $A \cup B = \{0,1,2,4,16\}$, a will be

（A）0 （B）1 （C）2 （D）4

Part II: Calculation

1. Suppose that $a_n > 0$ in a geometric sequence $\{a_n\}$, and its common ratio q is the root of equation $x(x+1)=6$, and the sum of the first four items of $\{a_n\}$ $s_4 = 1$. Find sum of the first eight items of $\{a_n\}$.

2. Find the maximum and minimumof $y = 5 + 3 \cdot 2^{x+1} - 4^x$ in the interval $0 \le x \le 2$.

3. A parabola intersect x axis at the point $A(-1,0)$ and point $B(1,0)$, and the point $M(0,1)$ is on the parabola. Write the equation of the parabola.

4. The straight line $x - 4y + 2 = 0$ has its slope $tg\alpha$. An straight line l_1 goes through the point $(1,1)$, and has its slope $tg2\alpha$. Find the equation of the straight line l_1.

5. Given $f(x) = \dfrac{a^x + 1}{a^x - 1}, (a > 0, a \ne 1)$, and $f(1) = 3$.
   (1) What is the value of a ?
   (2) What is the domain and the range of the function;
   （3）Is the function is odd or even?