COUNTRY_____ REFRENCE NUMBER_____

NAME:_____

2009 Math Test for the Japan-IMF Scholarship Applicants

(45 Minutes, full score : 25 points)

Please note:

- **You have only 45 minutes to complete;**
- **No Calculators are allowed;**
- **Please show all your work including calculation and other memo in the margin of this paper;**
- **Please write your name on each sheet of paper.**

[Part 1: 1 point for each question]

1 Compute: $0.6 \times 0.003 =$

ANSWER:

2 Compute: 7.5% of 2000=

ANSWER:

3 Simplify: $\frac{1}{2} - \frac{1}{3} + \frac{1}{4} =$

ANSWER:

4. Compute $\left(\frac{1}{64}\right)^{1/6} =$

ANSWER:

5 Simplify: $\ln(e^{0.4}) =$

ANSWER:

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[Part 2: 2 points for each question]

6. Find what values of x satisfy $3x - 7 > x + 3$

ANSWER:

7. Solve the following equation. $-4(x-5) = 2 - 3x$

ANSWER: x=

8. Solve the following simultaneous equations. $\begin{cases} 4x - 3y = 1 \\ 2x + 9y = 4 \end{cases}$

ANSWER: x= y=

9 Solve the following equation: $y^2 = 8y - 15$

ANSWER: y=

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[Part 3: 2 points for each question]

10. Differentiate the function below:

$$f(x) = 3x^4 + 2x \ + 7$$

ANSWER:

11. Find the partial derivative $\partial^2 f / \partial x \partial y$ when $f(x, y) = (x-2)^2 (2y+3)^3$

ANSWER:

12. Evaluate the following integral: $\int_0^2 (x - 3x^2) dx =$

ANSWER:

13. By producing and selling Q units of some commodity, a firm earns total revenue $R(Q) = -0.16Q^2 + 56Q$ and incurs cost $C(Q) = 0.04Q^2 + 8Q + 200$. What production level Q maximizes this firm's profits (namely, $R(Q) - C(Q)$)?

ANSWER:

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[Part 4: 2 points for each equation]

14. Evaluate the following sum:

$$\sum_{k=1}^{7}\left(\frac{1}{k}-\frac{1}{k+1}\right)=$$

ANSWER:

15. Compute the product matrix **AB** of two matrices **A** and **B**.

$$A=\begin{pmatrix}0 & -1\\ 1 & 0\end{pmatrix},\quad B=\begin{pmatrix}1 & 3\\ 2 & 4\end{pmatrix}$$

ANSWER: