Japan-IMF Scholarship Program for Asia 2016-17

Basic Mathematics Aptitude Test

(Full score: 40)

Please Note:

- You have 60 minutes to complete.
- No calculators are allowed.
- Please show all your work and write your answers in the designated space.

Thank you.

Reference Number: _____

Name: _____

Reference Number:_____ **Country:**_____

Name:_____

(Please show all your work here and write your answers in the designated space.)

[Part 1] (1 point for each question) Calculate the following:

1. 0.4×0.007

Answer:_____

2. 4% of 5000

Answer:_____

3. $\frac{1}{2}+\frac{1}{3}-\frac{1}{5}$

Answer:_____

4. $\left(\frac{1}{27}\right)^{1/3}$

Answer:_____

5. $\ln(e^{-0.3})$

Answer:_____

Reference Number:_____ **Country:**_____

Name:_____

(Please show all your work here and write your answers in the designated space.)

[Part 2] (2 point for each question) Answer the following questions:

1. Find what values of x satisfy $x + 5 > 2x - 3$

Answer:_____

2. Solve the following equation. $-3(x - 7) = 13 - x$

Answer:_____

3. Solve the following simultaneous equation.

$$\begin{cases} 4x + 3y = 0 \\ 8x - 9y = 5 \end{cases}$$

Answer:_____

4. Solve the following equation. $y^2 - 8 = y + 4$

Answer:_____

5. If a quadric function $y = ax^2 + bx + c$ goes through the points $(x, y) = (1,1)$, $(0,1)$ and $(2,2)$, then what are the values for the coefficients (a, b, c)?

Answer:_____

Reference Number:_____ **Country:**_____

Name:_____

(Please show all your work here and write your answers in the designated space.)

[Part 3] (3 point for each question) Answer the following questions:

1. Differentiate the function below:

$$f(x) = 0.25x^4 - 5x^2 - 21$$

Answer:_____

2. Find the partial derivative $\partial^2 f / \partial x \partial y$ when $f(x, y) = (5x - 2)^2 (y + 4)^3$

Answer:_____

3. Evaluate the following integral: $\int_0^3 (-3x^2 + 10)dx$

Answer:_____

4. By producing and selling Q units of some commodity, a firm earns total revenue $R(Q) = -0.1Q^2 + 10Q + 40$ and incurs cost $C(Q) = 0.1Q^2 + 2Q$. What production level Q maximizes this firm's profits (namely, $R(Q) - C(Q)$)?

Answer:_____

Reference Number:_____ **Country:**_____

Name:_____

(Please show all your work here and write your answers in the designated space.)

5. Differentiate the following function: $\ln(2x^2+1)$

Answer:_____

[Part 4] (5 point for each question) Answer the following questions:

1. Evaluate the following sum:

$$\sum_{k=1}^{12}\left(\frac{1}{k}-\frac{1}{k+1}\right)$$

Answer:_____

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

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

Answer:_____