

Japanese Grant Aid for Human Resource Development
Scholarship (JDS)

Basic Mathematics Aptitude Test
2013

Prepared by Graduate School of International Relations, International University of Japan

Note:

- You have 60 minutes to complete.
- No calculators are allowed.
- Show all your work and write your answers in the designated space.
- Part I and Part II are ‘Basic Math,’ and Part III and Part IV are ‘Applied Math.’ The test result is only for the reference purpose and basically does not affect the selection procedure. However, some accepting universities may require the candidates who apply for the economics-related fields of study to have analytical and numerical skills.

Name : _____

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

[PART I] Calculate the followings.

1. $5 - (1 - 4)$

Answer : _____

2. $-\left(\frac{1}{3} - \frac{3}{4}\right) + \frac{5}{12}$

Answer : _____

3. $0.5 \times \left(\frac{1}{4} - \frac{3}{2}\right) \div \frac{1}{4}$

Answer : _____

4. $\left(\left(\frac{1}{3}\right)^3 \times 3^{-5}\right)^{\frac{1}{4}} \times 3^2$

Answer : _____

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

[PART II] Answer the following questions.

1. Solve the following equation for x .

$$2x + 2 = \frac{x}{2} - 4$$

Answer : _____

2. Solve the following simultaneous equations.

$$-2x - 3y = -3$$

$$2x - y = -5$$

Answer : _____

3. Solve the following inequality for x .

$$-3x + 7 < x - 1$$

Answer : _____

4. Find the average of the following six values:

$$\left\{ -\frac{1}{2}, \frac{5}{13}, 15, -7, -\frac{5}{13}, \frac{1}{2} \right\}$$

Answer : _____

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

[PART III] Answer the following questions:

1. Solve the following for x .

$$-3x^2 + 5x + 2 = 0$$

Answer : _____

2. Solve the following inequality for x .

$$\left(\frac{1}{3}\right)^{3x+2} > 3$$

Answer : _____

3. Find the region of x satisfying the following inequalities.

$$\log_{0.5}(2x+3) > 0$$

Answer : _____

4. Solve the following simultaneous equations in the matrix form for x and y .

$$\begin{bmatrix} 1 & x+y \\ y & -1 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

Answer : _____

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

[PART IV] Answer the following questions:

1. Assume $x > 0$. Determine the first-derivative of the following (Note: The base of logarithm is e).

$$y = x \log(x) - 1$$

Answer : _____

2. Assume $a > 0$. Find the following definite integral.

$$\int_{-a}^a x^3 dx$$

Answer : _____

3. Let $A = \begin{bmatrix} 1-x & 2 \\ -2 & 2+x \end{bmatrix}$. Suppose the determinant of A is zero, so that A is not invertible. Solve for x .

Answer : _____

4. The profit π is described by the following function:

$$\pi = (200 - 2q)q - (2q^2 + 1500),$$

where q is output. Find the output q at which the profit is maximized, and find the corresponding profit π .

Answer : _____