

2008 A Math Test for the Japan-IMF Scholarship Applicants
(45 Minutes)

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

Application ID Number: _____

Name: _____

Part I. Calculate the following (one point each):

1. $\left(\frac{1}{3} + \frac{3}{4}\right) \times 3 - 3 =$

Answer:

2. $\frac{\left(\frac{1}{3} - \frac{1}{2}\right)}{\left(\frac{1}{2} + 1 + \frac{2}{3}\right)} =$

Answer:

3. $\left(\frac{(cy)^3}{(ax+b)^2}\right)^{\frac{1}{3}} \times \left(\frac{(ax+b)^3}{(cy)^{-2}}\right)^{\frac{1}{2}} =$

Answer:

4. $\ln\left(\frac{1}{x-1}\right) + \ln(x-1) + \ln\left(\frac{1}{e}\right) =$

Answer:

Part II Solve the following equations for x (two points each):

5. $4x^2 + 5 = 6,$
 $x > 0$

Answer:

6. $x^2 + 2x - 3 = 0,$
 $x < 0$

Answer:

Part III Differentiate y with respect to x for the following (two points each):

7. $y = (ax^2 + b)^3$

Answer:

8. $y = x^3 e^{\frac{1}{3}x}$

Answer:

Part IV Please answer the following question (three points)

9. A firm's total profit, π , is given by the following function:

$$\pi = a + bQ - cQ^2,$$
$$a, b, c > 0,$$

where Q denotes the output level. Then express the output level of Q at which π is maximized by using $a, b,$ and c .

End of the Test