

Rotterdam School of Management  
Erasmus University  
International Business Administration  
Math Entrance Exam April,17 2008

There are two parts:

For **part A** you have to do **eight** problems out of twelve.  
You can earn 3 points for each problem.

For **part B** you have to do **one** out of two problems. You can earn 12 points for this problem.

If you make more problems than asked for, only **the first eight** problems of part A and the **first** problem of part B will be considered.

You have to show in which way you come to your final answers.

When the words "Solve", "Calculate " or, "Compute" are used in the problems you have to give an exact answer.

When your result is **eighteen points or more** you have passed the exam.

Please do number your answering pages.

This exam consist out of 3 pages.

**Part A.**

1. Given is the function  $f(x) = |x - 2| - |-2x + 2|$

a. Draw the graph of this function.

b. Solve the equation  $f(x) = 3x + 1$

2. Given is the function  $f(x) = x^3 - 6x^2 - 15x + 7$

a. Find the coordinates of the point of inflection A.

b. Given is the point B(2, -39) on the graph of  $f$ .

Find the equation of the normal in point B.

3. Given is the function  $f(x) = \frac{2x+3}{4x-4}$

a. Draw the graph of the function

b. Solve the inequality  $-3 < f(x) < -1$

4. From an arithmetic progression is given:  $t_6 = 10$  and  $t_3 - 2t_8 = -31$

a. Calculate  $t_1$  and  $d$ .

- b. Calculate  $S_{12}$
5. A vase contains 4 blue and 12 red marbles.  
There are taken 3 times one marble without putting the marbles back.  
Calculate:  
a.  $P(3 \text{ red})$   
b.  $P(2 \text{ red} \wedge 1 \text{ blue})$   
c. Give the answers to the questions a and b if the marbles are put back.
6. Solve the following equations  $x \in [0, \pi]$   
a.  $\sin 4x = \frac{1}{3} \sin 2x$   
b.  $\cos^2 x + 2 \sin^2 x = 2 \cos x + 5$
7. Given is the area A:  
 $x + y \leq 6 \wedge y < 2x - 4 \wedge x \geq -1$   
a. Draw the area A in the  $x - y$  plane  
Given is the function  $f(x, y) = 2x + y - 3$   
b. Determine the range of function  $f$  on A
8. Given is the function  $f(x) = 3x^4 e^{-x}$   
Find the equation of the tangent in point A on the graph of  $f$ .  $x_A = 1$
9. Solve the following equations:  
a.  $\sqrt{x+2} - 2x = -11$   
b.  $\log(5-x) - \log(x+2) = 1$
10. Given is the line  $l: 3x + 4y = 12$  and point  $A(2, -5)$ .  
a. Draw the line  $l$  in the  $x - y$  plane.  
b. Find the equation of line  $m$  perpendicular to  $l$  intersecting A.
11. Calculate the first derivative of  
a.  $f(x) = {}^2 \log \frac{x+6}{x^2-5x+9}$   
b.  $f(x) = 7^{3x-4}$

12. Given are the following sets:

$$A = \{x \in \mathbb{R} \mid x \text{ is a multiple of } 3 \text{ and } x \leq 29\}$$

$$B = \{x \in \mathbb{R} \mid x \text{ is even and } x \leq 30\}$$

- a. Calculate  $P(A \mid B)$
- b. Calculate  $P(B \mid A)$

### Part B

1. Given is the function  $f(x) = x^4 + 3x^2 - 4$ 
  - a. Calculate the coordinates of the intersection points with the  $x$ -axis.
  - b. Coordinate the extremes of  $f(x)$ .
  - c. Are these extremes maxima or minima? Explain your answer.
  - d. Calculate the coordinates of the point(s) of inflection.

Given is the function  $g(x) = x^4 - 4x^2 + 3$

- e. Calculate the surface area between the graphs of  $f$  and  $g$ .

2. Given are the matrices:

$$A = \begin{pmatrix} 7 & 6 \\ 4 & 2 \end{pmatrix} \text{ and } B = \begin{pmatrix} -1 & 5 \\ -2 & 3 \end{pmatrix}$$

- a. Calculate  $BA$ .
- b. Calculate Determinant  $B$ .
- c. Calculate the inverse of  $A$
- d. Calculate the eigen values of  $A$
- e. Calculate the eigen vectors of  $A$ .