

Rotterdam School of Management
Erasmus University Rotterdam
International Business Administration
Math Entrance Exam 26 Februar 2009

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. Solve the following equations:

a. $\sin 2x = -2\sin x$ $x \in [0, 2\pi]$

b. $\cos 2x = 1 + 8\sin x$ $x \in [0, 2\pi]$

2. Given is the function $f(x) = \sqrt{5x+4}$

Calculate the equation of the normal on the graph of f in point A with x-coordinate 9

3. Calculate the first derivative of the following functions

a. $f(x) = 4^{2\ln x}$

b. $f(x) = (3x^5 - 7x^3 + 6x^2 - 11)^9$

4. Given is the function $f(x) = \frac{3x+6}{5x-10}$

a. Draw the graph of the function

b. Solve the inequality $0 < f(x) < 2$

5. Given is the area A:

$$x + y \leq 3 \wedge y \leq 2x - 6 \wedge x \geq -2$$

a. Draw the area A in the $x - y$ plane

Given is the function $f(x, y) = 3x + 2y - 6$

b. Determine the range of function f on A

6. A vase contains 6 white, 5 blue and 7 red marbles.

Without putting back 3 marbles are drawn.

a. Calculate $P(3 \text{ blue})$

b. Calculate $P(\text{no red})$

7. Given is the line $l: 4x - 3y = 12$ and point $A(1, -4)$.

a. Draw the line l in the $x - y$ plane.

b. Find the equation of line m perpendicular to l intersecting A.

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

a. Draw the graph of this function.

b. Solve the equation $f(x) = 2x - 1$

9. Solve the inequality $\log_3(x^2 - 5x + 31) \geq 4$ Consider base of log is 3.

10. Renate is throwing a dice. Stochastic X is defined as:

X = 1 if she throws a 2 or a 5.

X = 4 if she throws a 3.

X = 8 if she throws a 1 or a 4 or a 6.

Calculate:

a. $E(X)$.

b. $\sigma(X)$.

11. Of an arithmetic progression is given $t_2 = 9$ en $2t_3 + 3t_5 = 100$

Calculate:

a. t_9

b. S_6

12. Given is the function $f(x) = -x^3 + 7x^2 - 2x + 4$
- Find the coordinates of the point of inflection A.
 - Given is the point B(2, 20) on the graph of f .
Find the equation of the tangent in point B.

Part B

1. Given is the function $f(x) = x^4 - 6x^2 + 8$
- Calculate the coordinates of the intersectionpoints of the graph of f with the x-axis.
 - Calculate the coordinates of the extremes of the graph of f .
 - Calculate the coordinates of the points of inflection of the graph of f .
 - Draw the graph of f .

Given is the function $g(x) = -7x^2 + 14$

- Solve the inequality $f(x) \leq g(x)$
2. Given are the matrices:
- $$A = \begin{pmatrix} 7 & -3 \\ -8 & 2 \end{pmatrix} \text{ and } B = \begin{pmatrix} -1 & 5 \\ -2 & 3 \end{pmatrix}$$
- Calculate BA.
 - Calculate Determinant B.
 - Calculate the inverse of A
 - Calculate the eigen values of A
 - Calculate the eigen vectors of A.