RSM Erasmus University Rotterdam
International Business Administration

Math Entrance Exam March 13, 2007

Ther e 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.

When your result is **eighteen points or more** you have passed the exam.
This exam consists out of 2 pages.

Please do number your answering pages.

Part A

1. Solve the inequality $^2\log(x^2 - 2x + 29) \geqslant 5$

2. Given is the function $f : x \longrightarrow 3\sin 2(x - \frac{2}{3}\pi) - 1$
   Draw one period of the graph of this function.

3. Given is the function $f(x) = \frac{2x-5}{x+3}$
   Find the equation of the normal in point A on the graph of f.
   The x-coordinate of A is 5.

4. Given are the following sets:
   $A = \{x \in \mathbb{R} \mid x \textit{ is a multiple of } 3 \textit{ and } x \leqslant 25\}$
   $B = \{x \in \mathbb{R} \mid x \textit{ is even and } x \leqslant 23\}$
   a. Calculate P $(A \mid B)$
   b. Calculate P $(B \mid A)$

5. Given is de function $f(x) = 5x^3 - 20x^2 + 7x - 6$
   a. Calculate the coordinates of the point of inflection A of the graph of f.
   b. Find the equation of the tangent in A on the graph of f.

6. Solve the following equations:
   a. sin 2x = -3cos x x ∈ [0,2π]
   b. cos 2x = 1 + 4sin x x ∈ [0,2π]

7. Solve the inequality $\sqrt[2]{2x + 3} \geqslant x$

8. From a geometric progression is given $t_3 = 162$ and $t_6 = 6$
   a. Calculate t_{10}
   b. Calculate S_4
   c. Calculate the sumlimit S

9. Draw in the x-y plane the area A given by $y < 2\ln x$, $y > -2\ln x$ and $x < e$

10. A vase contains 3 white, 6 blue and 9 red marbles.
    Without putting back 3 marbles are drawn.
    a. Calculate P(3 white)
    b. Calculate P(no blue)

11. Calculate the first derivative of the following functions
    a. f(x) = $4^{\ln x}$
    b. f(x) = $(x^3 - 5x^2 + 6x - 2)^9$

12. Calculate $\int_1^e \frac{4\ln^3 x - 6\ln x}{x}$

Part B

1. Given is the function $f(x) = x^4 - 6x^2 - 7$
   a. Calculate the coordinates of the intersectionpoints of the graph of f with the x-axis.
   b. Calculate the coordinates of the extremes of the graph of f.
   c. Calculate the coordinates of the points of inflection of the graph of f.
   d. Draw the graph of f.
   Given is the function $g(x) = -7x^2 - 5$
   e. Solve the inequalty $f(x) \leqslant g(x)$

2. Given are the matrixes
   A = $\begin{pmatrix} 2 & 5 \\ 6 & 3 \end{pmatrix}$ and B = $\begin{pmatrix} -5 & 4 \\ 1 & -3 \end{pmatrix}$
   a. Calculate A • B.
   b. Calculate the determinant of A.
   c. Calculate the inverse of A.
   d. Calculate the eigen values of A.
   e. Calculate the eigen vectors of A.