MÄLARDALEN UNIVERSITY
School of Education, Culture and Communication
Division of Applied Mathematics
Examiner: Anatoliy Malyarenko

EXAMINATION IN MATHEMATICS
MMA302 Calculus I
Date: March 18, 2009 *Time:* 3 hours
Aids: Pen, ruler, eraser, list of formulas

This exam consists of five problems, each of which is worth 4 points. Premium points obtained in the problem solving class will be taken into account. Marks:

Points	ECTS mark	Swedish mark
20-23	A	VG
18–19	B	VG
15–17	C	G
12–14	D	G
9–11	E	G

1. Determine the following limit (if it exists).

$$\lim_{\theta\to 0}\frac{\cos\theta\tan\theta}{\theta}.$$

2. Evaluate the derivative of the implicit function $(x^2+y^2)^2 = 4x^2y$ at the point $(1,1)$.

3. Evaluate the definite integral

$$\int_0^2 e^{-x}\cos x\,dx.$$

4. Find the particular solution of the differential equation that satisfies the boundary condition.

$$x^3y' + 2y = e^{1/x^2}, \qquad y(1) = e.$$

5. Use the Root Test to determine the convergence or divergence of the series.

$$\sum_{n=1}^{\infty}\left(\frac{2n}{n+1}\right)^n.$$

Good luck!