

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).

$$\lim_{x \rightarrow 0} \frac{2 \tan^2 x}{x}.$$

2. Evaluate the derivative of the implicit function $(4 - x)y^2 = x^3$ at the point $(2, 2)$.

3. Evaluate the definite integral

$$\int_0^1 \ln(1 + x^2) dx.$$

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

$$y' + y \sec x = \sec x, \quad y(0) = 4.$$

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

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

Good luck!