

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
20–24	A	VG
18–19	B	VG
15–17	C	G
12–14	D	G
9–11	E	G

1. Evaluate the limit or explain why it does not exist.

$$\lim_{x \rightarrow -1} \frac{x^3 + 1}{x + 1}.$$

2. Let  $y = \sec x$ .

- a) Find  $y'$  (1 p.)  
b) Find  $y''$  (1 p.)  
c) Find  $y'''$  (2 p.)

3. Evaluate the integral

$$\int x^2 \tan^{-1} x \, dx.$$

4. Solve the separable differential equation.

$$\frac{dy}{dx} = 1 + y^2.$$

5. Consider the following power series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n}{n^4 2^{2n}} x^n.$$

- a) Determine the centre of convergence (1 p.)  
b) Determine the radius of convergence (1 p.)  
c) Determine the interval of convergence (2 p.)

Good luck!