

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.

$$\lim_{x \rightarrow 8} \frac{x^{2/3} - 4}{x^{1/3} - 2}.$$

2. Let $y = \frac{\sin x}{x}$.

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

3. Evaluate the integral

$$\int_0^1 x^2 \sin(\pi x) dx.$$

4. Solve the separable differential equation.

$$\frac{dy}{dx} = y^2(1 - y).$$

5. Consider the following power series.

$$\sum_{n=0}^{\infty} \frac{e^n}{n^3} (4 - x)^n.$$

- 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!