

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.

$$\lim_{x \rightarrow 0} \frac{\cos(2x) - \cos(x)}{\sin(x)}$$

2. Let $f(x) = x - x^3$. Find the absolute maximum of f on the interval $[0, 10]$.

3. Evaluate the definite integral.

$$\int_0^2 \frac{\cos(2x) + 2 \sin^2(x)}{e^x} dx$$

4. Solve the differential equation

$$e^{-x}y' + 2y = 0$$

5. Determine if the series converges or diverges.

$$\sum_{n=1}^{\infty} \frac{e^{2n+1}}{n^n}$$

Good luck!