

Use of calculators, mobile phones or pagers is not allowed during the exam.

1. Evaluate the following integrals:

[3 pts each]

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

b. $\int \frac{\csc^4 x}{\sqrt[3]{\cot x}} \, dx$

c. $\int \frac{1}{1 + \sin 3x + \cos 3x} \, dx$

d. $\int \frac{\sqrt{e^{2x} - 2e^x - 8}}{1 - e^{-x}} \, dx$

e. $\int \frac{2}{(1 + x^2)(1 + x)} \, dx$

f. $\int \frac{1}{x + \sqrt{x}} \, dx$

2. Determine the convergence or divergence of the following integral. If convergent, find its value.

[4 pts]

$$\int_1^{\sqrt{2}} \frac{x^3}{\sqrt[3]{x^2 - 1}} \, dx$$

3. Find the length of the plane curve C with parametrization:

[3 pts]

$$x = t \cos \sqrt{t}; \quad y = -t \sin \sqrt{t}; \quad 0 \leq t \leq 2\pi$$