

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

1. Evaluate the following integrals:

[3 pts each]

a. $\int x^3 \tan^{-1} x \, dx$

b. $\int \frac{\sqrt{e^x} (e^x + 2)}{\sqrt[3]{e^{-2x} - 4e^{-x} - 1}} \, dx$

c. $\int \sec x \sqrt{\frac{1 - \sin x}{1 + \sin x}} \, dx$

d. $\int \frac{\sqrt{\cos^2 x - 8 \cos x + 13}}{4 \csc x - \cot x} \, dx$

e. $\int \frac{4x}{8 - x^3} \, dx$

f. $\int \frac{1}{\sqrt{4 - \sqrt{x}}} \, dx$

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

[4 pts]

$$\int_1^{\sqrt{2}} \operatorname{csch}(\ln x) \, dx$$

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

[3 pts]

$$x(t) = \int_1^t \sqrt{\sqrt{u} + \frac{1}{\sqrt{u}}} \, du; \quad y(t) = \int_1^t \sqrt{\sqrt{u} - \frac{1}{\sqrt{u}}} \, du; \quad 1 \leq t \leq 16$$