

Calculators, mobile telephones, pagers and their use are disallowed.

Answer all the following questions

1. Evaluate the following integrals:

[3 pts each]

(a) $\int \sec^{-1} \sqrt{x} \, dx$

(b) $\int \frac{\sec^6 x}{\sqrt{\tan^2 x}} \, dx$

(c) $\int \frac{1}{(x^2 + 8x + 7)^{\frac{3}{2}}} \, dx$

(d) $\int \frac{1}{\sqrt[3]{x^7} (\sqrt{x} + \sqrt{x})} \, dx$

(e) $\int \frac{\sec x}{3 \tan x - 4} \, dx$

2. Test the integral

$$\int_1^{\infty} \frac{x^2}{(x^2 + 1)^2} \, dx$$

for convergence or divergence, and find its value if convergent.

[4 pts]

3. Let C be the curve parametrized by:

[3 pts each]

$$x = \sqrt{1+t}, \quad y = \sqrt{1-t}; \quad |t| \leq \frac{1}{\sqrt{2}}$$

(a) Find the equation of the tangent line to C at the point corresponding to $t = 0$.

(b) Find the arclength of the curve C .