

Answer all questions. Calculators and Mobile Phones are not allowed.

1. (3 pts. each) Find the limit, if it exists.

(a) $\lim_{x \rightarrow 0} (\tan^{-1} x) \csc x.$

(b) $\lim_{x \rightarrow \infty} (1 - e^{-2x})^x.$

2. (3 pts. each) Evaluate the following integrals:

(a) $\int_2^4 \frac{2x + 1}{\sqrt{6x - x^2 - 5}} dx.$

(b) $\int \frac{\coth^3 x}{\sinh^5 x} dx.$

(c) $\int \frac{x^3 + 8}{x^4 + 4x^2} dx.$

(d) $\int \frac{1}{3 - \sin x} dx.$

(e) $\int x^3 \ln \sqrt[3]{x^2 + 4} dx.$

3. (4 pts.) Evaluate, if possible, the integral

$$\int_{-3}^0 \frac{x}{(1 - x^2)^2} dx.$$