



King Saud University

Department of Mathematics

2nd Semester 1432-1433 H

MATH 111 (Integral Calculus)

2nd Midterm Exam

Duration: 90 Minutes

Student's Name	Student's ID	Group Number	Lecturer's Name

Question Number	I	II	Total
Mark			

Question I: A. Choose the correct answer (1.5 Marks)

(1) If $f(x) = \sinh^{-1} e^x$ then $f'(0)$ equals

(a) $-\frac{1}{2}$

(b) $-\frac{1}{\sqrt{2}}$

(c) $\frac{1}{\sqrt{2}}$

(d) None of the previous

(2) $\int x 3^{x^2} dx$ equals

(a) $\frac{3^{x^2}}{2 \ln 3} + C$

(b) $2 \frac{3^{x^2}}{\ln 3} + C$

(c) $2(3^{x^2} \ln 3) + C$

(d) None of the previous

(3) $\cosh nx + \sinh nx$ equals

(a) e^{-nx}

(b) e^{nx}

(c) 1

(d) None of the previous

B. Prove that $\tanh^{-1} x = \frac{1}{2} \ln \left(\frac{1+x}{1-x} \right), \quad \forall x \in (-1,1)$ **(2 Marks)**

C. Solve the following equation for x **(1.5 Marks)**

$$(2x+3)e^{\ln\left(\frac{1}{x^2}\right)} = 1, \quad x \neq 0$$

Question II: Compute the following integrals

(a) $\int \frac{1}{\sqrt{x^2 + 8x + 25}} dx$ (2.5 Marks)

(b) $\int \tan^3 x \sec^4 x dx$ (1.5 Marks)

(c) $\int \frac{\sqrt{9-x^2}}{x^2} dx$

(2.5 Marks)

(d) $\int x^4 \ln x dx$

(1.5 Marks)

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

(2 Marks)

Good Luck😊