KING SAUD UNIVERSITY

Math Department **Mai 21 -2025**

Time: 180mn

Final exam Math106

Question 1(3+3+2)

a) Use the substitution $u = 1 + x^2$ to compute $\int x^5\sqrt{1+x^2}\,dx$.

b) Find the number(s) c that satisfies the conclusion of the mean value theorem for the function $f(x) = \frac{1}{(x+1)^2}$ on $[0, 3]$.

c) Evaluate the integral $\int \frac{dx}{x\sqrt{4-(lnx)^2}}$

Question 2(3+3+3)

a) Find the indefinite integral $\int x(cosx)^2 dx$

b) Compute $\int (cosx)^5 (sinx)^6 dx$

c) Evaluate $\int \frac{x^2}{\sqrt{25-x^2}} dx$

Question 3(3+3+2)

a) Find $\lim_{x\to 0^+} (\frac{1}{x})^{x^2}$

b) Evaluate the integral $\int \frac{x+4}{x(x+1)^2} dx$

c) Compute $\int \frac{1}{\sqrt{x^2+4x+3}} dx$