

King Saud University
Faculty of Sciences
Department of Mathematics

Final Examination	Math 106	Semester I - 1442
Time: 3H		

Question 1 : (2+2+3)

- a) Use Trapezoid rule with $n = 5$ to approximate $\int_0^5 \frac{dx}{1+x^3}$.
- b) Find the number(s) c that satisfies the conclusion of the mean value theorem for $f(x) = (x-2)^2$ on $[-1, 5]$.
- c) Evaluate the integral $\int x \sin(x^2) 3^{\cos(x^2)} dx$.

Question 2 : (3+3+3)

- a) Evaluate the integral $\int \frac{dx}{x\sqrt{x^4-1}}$.
- b) Compute the integral $\int \frac{\cot x dx}{\sqrt{1-\sin^4 x}}$.
- c) Find the indefinite integral $\int \cosh^{-1} x dx$.

Question 3 : (3+3+3)

- a) Compute the integral $\int \frac{dx}{(x^2+4)^2}$.
- b) Evaluate the integral $\int \frac{dx}{x^{\frac{1}{2}} - x^{\frac{1}{3}}}$.
- c) Find $\int \frac{dx}{5+3\cos x+4\sin x}$.

Question 4 : (3+3+3)

- a) Does the integral $\int_0^{+\infty} (1+x)e^{-2x} dx$ converge? Find its value if it does.

- b) Sketch the region bounded by the curves $y = (x-1)^2$, $y = (x+1)^2$, $y = 0$ and find its area.
- c) Find the volume obtained by revolving the region bounded by $y = x^2$ and $y = \sqrt{x}$ about the x -axis.

Question 5 : (3+3)

- a) Compute the area of the surface of revolution obtained by revolving the parametric curve $x = -2 + 2t^2$, $y = 4t$, $0 \leq t \leq 1$, about the x -axis.
- b) Sketch the region inside the curve $r = 1 + \sin \theta$ and outside $r = 1 - \sin \theta$ and find its area.