



KING SAUD UNIVERSITY
College of Science
Department of Mathematics

First Semester (1433/1434)

Final Exam, M-106

Programmable Calculators are Not Authorized

Name:	Number:
Name of Teacher:	Group No:

Max Marks: 40

Time: Three hours

The Exam paper contains 8 pages
(15 Multiple choice questions and 6 Full questions)

Multiple Choice (1-15)	
Question # 16	
Question # 17	
Question # 18	
Question # 19	
Question # 20	
Question # 21	
Total	

Multiple Choice

Q. No:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
$\{a, b, c, d\}$	b	c	c	b	a	d	d	b	c	b	a	d	b	b	b

Q. No: 1 $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{2k}{n^2}$ is equal to:

- (a) 0 (b) 1 (c) 2 (d) ∞

Q. No: 2 The average value of the function $f(x) = \sin(3x)$ on $[0, \frac{\pi}{3}]$ is equal to:

- (a) $-\frac{2}{\pi}$ (b) $\frac{2}{3}$ (c) $\frac{2}{\pi}$ (d) $-\frac{2}{3}$

Q. No: 3 The integral $\int_0^1 \left| x - \frac{1}{2} \right| dx$ is equal to:

- (a) 0 (b) 1 (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

Q. No: 4 The intergral $\int \frac{\sin x}{1 + \cos^2 x} dx$ is equal to:

- (a) $-\tan^{-1}(\sin x) + c$ (b) $-\tan^{-1}(\cos x) + c$
 (c) $\tan^{-1}(\sin x) + c$ (d) $\tan^{-1}(\cos x) + c$

Q. No: 5 The integral $\int 2^{-x} \tanh(2^{1-x}) dx$ is equal to:

- (a) $\frac{1}{-2 \ln 2} \ln \cosh(2^{1-x}) + c$ (b) $\frac{1}{-\ln 2} \ln \cosh(2^{1-x}) + c$
 (c) $\frac{1}{-2 \ln 2} \tanh^2(2^{1-x}) + c$ (d) $\frac{1}{-2 \ln 2} \ln \sinh(2^{1-x}) + c$

Q. No: 6 If $F(x) = \pi^x \int_0^{x^2} \tan^{-1}(t) dt$, then $F'(x)$ is equal to:

- (a) $\pi^x F(x) \ln \pi + 2x\pi^x \tan^{-1} x$ (b) $\pi^x F(x) \ln \pi + 2x\pi^x \tan^{-1} x^2$
 (c) $F(x) \ln \pi + 2x\pi^x \tan^{-1} x$ (d) $F(x) \ln \pi + 2x\pi^x \tan^{-1} x^2$

Q. No: 7 $\lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \tan x}{\cos(2x)}$ is equal to:

- (a) 2 (b) -2 (c) -1 (d) 1

Q. No: 8 If a point has xy -coordinates $(x, y) = (\sqrt{2}, \sqrt{2})$ then one of its polar coordinates (r, θ) is:

- (a) $(1, \frac{\pi}{4})$ (b) $(2, \frac{\pi}{4})$ (c) $(\sqrt{2}, \frac{\pi}{4})$ (d) $(\sqrt{2}, \frac{3\pi}{4})$

Q. No: 9 The integral $\int_1^2 x \ln(x) dx$ is equal to:

- (a) $2 \ln 2 - \frac{5}{4}$ (b) $2 \ln 2 + \frac{5}{4}$ (c) $2 \ln 2 - \frac{3}{4}$ (d) $2 \ln 2 + \frac{3}{4}$

Q. No: 10 The slope of the tangent line at the point corresponding to $t = 1$ on the curve given parametrically by the equations $x = t^3 + t$, $y = -3t$, is:

- (a) $-\frac{1}{2}$ (b) $-\frac{3}{4}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

Q. No: 11 If a graph has polar equation $r = -4 \cos \theta$, then its equation in xy -system is:

- (a) $x^2 + 4x + y^2 = 0$ (b) $x^2 - 4x + y^2 = 0$
(c) $x^2 - x + y^2 = 0$ (d) $x^2 + y^2 = 0$

Q. No: 12 The arc length of the curve $C : x = 4 \cos(t)$, $y = 4 \sin(t)$, $-\frac{\pi}{2} \leq t \leq \frac{\pi}{2}$ equals:

- (a) 2π (b) 8π (c) π (d) 4π

Q. No: 13 The surface area resulting by revolving the graph of the equation $x = y$, $0 \leq y \leq 1$ around the y -axis is equal to:

- (a) $8\sqrt{2}\pi$ (b) $\sqrt{2}\pi$ (c) $24\sqrt{2}\pi$ (d) $\frac{9}{2}\sqrt{2}\pi$

Q. No: 14 The improper integral $\int_0^\infty \frac{1}{x+1} dx$

- (a) converges to 0 (b) diverges (c) converges to 1 (d) converges to -1

Q. No: 15 The graph of the curve C defined by the parametric equations $x = t + 1$; $y = t^2 + 1$, $-3 \leq t \leq 1$ is a:

- (a) a straight line (b) a parabola (c) an ellipse (d) a circle