

Department of Mathematics

King Saud University

M-106

Final Examination

Semester 2 (1425/1426)

Max. Marks: 50

Time: 3hours

Name:..... Number:.....

Name of Teacher.....Group No:.....

Marks: Multiple Choice:.....[]

Question(1).....[]

Question(2).....[]

Question(3).....[]

Question(4).....[]

Question(5).....[]

Total:.....[]

Multiple Choice

Question No. 1 $\sum_{k=1}^n (k+3)$ is equal to

- (a) $\frac{n^2+6n}{2}$ (b) $\frac{n^2+7n}{2}$ (c) $\frac{n^2+n}{2}$ (d) None of these.

Question No. 2 If $\int_0^9 f(x) dx = 5$ then $\int_0^3 f(3u) du$ is equal to

- (a) $\frac{5}{2}$ (b) $-\frac{5}{3}$ (c) $\frac{5}{3}$ (d) None of these.

Question No. 3 If $f(x) = \int_2^x \sqrt{2t+5} dt$ then $f''(2)$ is equal to

- (a) $\frac{1}{3}$ (b) $-\frac{1}{3}$ (c) 0 (d) None of these.

Question No 4 The average value of the function $f(x) = x^2$ on the interval $[1,4]$ is

- (a) -7 (b) 7 (c) $\frac{1}{7}$ (d) None of these.

Question No. 5 If $\int_2^3 f(x) dx = 10$ and $\int_2^3 g(x) dx = -1$; then $\int_2^3 [3f(x) - 2g(x) + 4]$

- (a) 30 (b) 36 (c) 3 (d) None of these.

Question No. 6 If $\int_0^1 f(x) dx = 7$ and $\int_0^3 f(x) dx = 6$ then $\int_1^3 f(x) dx$ is equal to

- (a) -3 (b) 0 (c) -1 (d) None of these.

Question No.7 $\lim_{x \rightarrow 0^+} \ln(x)$ is equal to

- (a) $-\infty$ (b) ∞ (c) does not exist (d) None of these.

Question No 8 If $\ln(2x-3) = 0$ then x is equal to

- (a) $\frac{3}{2}$ (b) -2 (c) 2 (d) None of these.

Question No.9 $\int_0^{\frac{\pi}{2}} \cos x \sin(\sin x) dx$ is equal to

- (a) $-1-\cos(1)$ (b) $1-\cos(1)$ (c) $1+\tan(1)$ (d) None of these.

Question No.10 $\lim_{x \rightarrow +\infty} \frac{4e^x}{x^2}$ is equal to

- (a) $\frac{4}{3}$ (b) 0 (c) $+\infty$ (d) None of these

Question No.11 If $\int \tan x (\tan^2 x + 1) dx = f(x)$ then $f(x)$ is equal to

- (a) $\frac{1}{4} \tan^4 x - \ln(\cos x) + c$ (b) $\frac{1}{2} \sec^2 x - x + c$ (c) $\frac{1}{2} \tan^2 x + c$ (d) None of these.

Question No.12 If $\int x \cosh x dx = f(x)$ then $f(x)$ is

- (a) $\frac{1}{2} x^2 - \sinh x + c$ (b) $x \sinh x - \cosh x + c$ (c) $\frac{1}{2} \sinh^2 x + c$ (d) None of these.

Question No.13 The integral for finding the length of the graph of $f(x) = \cos(\pi \leq x \leq 2\pi)$ is equal to:

- (a) $\int_{\pi}^{2\pi} \sqrt{1 + \sin^2 x} dx$ (b) $\int_{\pi}^{2\pi} \sqrt{1 - \sin^2 x} dx$ (c) $\int_{\pi}^{2\pi} \sqrt{1 + \cos^2 x} dx$ (d) None of these.

Question No.14 If $u = 0$ then $\cosh(u)$ is equal to

- (a) 0 (b) 1 (c) 3 (d) None of these.

Question No. 15 If $y = x^x$ then y' is equal to

- (a) $(1 + \ln x)x^x$ (b) $(1 - \ln x)x^x$ (c) $(x + \ln x)x^x$ (d) None of these.

Question No.16 The polar equation of the line $x = 3$ is equal to

- (a) $r = 3 \sec \theta$ (b) $r = 3$ (c) $r = 3 \cos \theta$ (d) None of these

Question No.17 If a point has $(r, \theta) = (-5, \pi)$, its (x, y) coordinates are

- (a) $(-5, 0)$ (b) $(-5, \pi)$ (c) $(5, 0)$ (d) None of these.

Question No.18 If a point has $(x, y) = (0, 1)$, then one of its (r, θ) coordinates are

- (a) $(-1, \pi)$ (b) $(1, 0)$ (c) $(-1, \frac{\pi}{2})$ (d) None of these.

Question No. 19 If $x = \cos \theta$, $y = \sin \theta$, then $\frac{dy}{dx}$ is equal to

- (a) $-\cot \theta$ (b) $\cot \theta$ (c) $\tan \theta$ (d) None of these.

Question No. 20 Area of the surface generated by revolving the curve
(C: $x = t$, $y = 2t$, $0 \leq t \leq 4$) about the x-axis is

- (a) $48\pi\sqrt{5}$ (b) $16\pi\sqrt{5}$ (c) $32\pi\sqrt{5}$ (d) None of these.

Question No.1

(a): Approximate the integral $\int_0^2 \sqrt{1+x^2} dx$
by using the Simpson's rule with $n = 4$.

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

Question No.2

(a) Evaluate the integral $\int \frac{1}{x^2 + 2x + 3} dx$;
(By completing the Square Method)

(b) Evaluate the integral $\int \frac{\sin^3 x}{\sqrt{\cos x}} dx$.

(4)

Question No.3

(a) Evaluate the integral $\int \frac{1}{1 - \sin x} dx$

(b) Evaluate the integral $\int \frac{\log_5 x}{x} dx$;

Question No.4:

(a) Evaluate the integral $\int \frac{1}{x^2 + x - 2} dx$
(By using Partial fractions)

(b) Prove that the integral $\int_0^1 x \ln x dx$ is
convergent

(5)

Question No.5:

(a) Set up the integrals that can be used to find the volume of the solid generated if the region R, bounded by the graphs of the equations

$$x + y = 3 \quad \text{and} \quad y + x^2 = 3$$

is revolved about the line $x = 3$ using:

(i) Disk or Washer (ii) Cylindrical Shells.

(b) Set up integral that can be used to find the area of the region inside the graphs of both the equations $r = 2 \cos \theta$, $r = 2 \sin \theta$.