



1. The number of mappings which are not one-one on a set $A = \{a, b, c, d\}$ is
 (A) 24 (B) 256 (C) 232 (D) 16
2. The domain of the function $f(x) = \frac{1}{\sqrt{|x| - x}}$ is
 (A) $\mathbb{R} - \{0\}$ (B) The open interval $(-\infty, 0)$
 (C) The open interval $(0, \infty)$ (D) The closed interval $(-1, 1)$
3. If $N = 100!$, then $\frac{1}{\log_2 N} + \frac{1}{\log_3 N} + \dots + \frac{1}{\log_{100} N}$ is
 (A) 100 (B) 2 (C) 0 (D) 1
4. Which one of the following subset in \mathbb{R}^2 is not convex?
 (A) $\{(x, y) : x^2 + y^2 \leq 25\} \cup \{(x, y) : x^2 + y^2 = 1\}$
 (B) $\{(x, y) : 0 \leq x \leq 2, 0 \leq y \leq 2\} \cup \{(x, y) : |x| \leq 2, |y| \leq 2\}$
 (C) $\{(x, y) : |x| \leq 1, |y| \leq 1\} \cup \{(x, y) : 2 \leq x \leq 5, 3 \leq y \leq 5\}$
 (D) $\{(x, y) : 0 \leq x \leq 2 \text{ and } y \leq x\}$
5. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ and $g : \mathbb{R} \rightarrow \mathbb{R}$ be continuous functions, where \mathbb{R} is the set of all real numbers. Then the value of the integral $\int_{-\pi/2}^{\pi/2} [f(x) + f(-x)][g(x) - g(-x)] dx$ is
 (A) π (B) -1 (C) 1 (D) 0
6. If $1, \alpha_1, \alpha_2, \dots, \alpha_{24}$ are the 25th roots of unity, then $(1 - \alpha_1)(1 - \alpha_2) \dots (1 - \alpha_{24})$ is
 (A) 24 (B) 25 (C) 1 (D) -1
7. The curve represented by $\operatorname{Im}\left(\frac{1}{z}\right) = c$, where $c \neq 0$ and z is a complex variable, is
 (A) a straight line (B) a circle
 (C) a rectangular hyperbola (D) a parabola
8. If $l, m, n \in \mathbb{R}, l \neq 0$, and the quadratic equation $lx^2 + mx + n = 0$ has no real roots, then
 (A) $l + m + n = 0$ (B) $(l + m + n)n < 0$
 (C) $lm + ln + mn = 0$ (D) $(l + m + n)n > 0$



9. The system $x + y + 2z = a_1$, $-2x - z = a_2$, $x + 3y + 5z = a_3$ has no solution if
- (A) $a_3 = a_2$ and $a_1 \neq 0$ (B) $a_3 = a_2 = a_1 = 0$
(C) $a_3 = 3a_1$ and $a_2 = 0$ (D) $a_2 = -3a_1$ and $a_3 = 0$

10. If $A = \begin{bmatrix} 1 & 0 & x \\ 0 & 1 & y \\ 0 & 0 & -1 \end{bmatrix}$ then $A^{100} - A^{50} + A^{25} - A + I$ is

- (A) 0 (B) A (C) $-A$ (D) I
11. The straight line $x + y = a$ touches the parabola $x^2 - x + y = 0$ if
- (A) $a = 1$ (B) $a = -1$
(C) $a = 0$ (D) a takes any value
12. What points $P(x, y)$ satisfy the inequality $x^2 + y^2 - 2x - 4y - 4 < 0$?
- (A) P lies inside the ellipse with focus (1, 2) and eccentricity 2
(B) P lies outside the ellipse with focus (1, 2) and eccentricity 2
(C) P lies inside the circle of radius 3 with centre (1, 2)
(D) P lies outside the circle of radius 3 with centre (1, 2)
13. The maximum number of points of intersection of a circle and a parabola is
- (A) 1 (B) 2 (C) 3 (D) 4
14. The angle between the lines whose direction cosines are $(1, -1, 0)$ $(-1, -1, -1)$ is
- (A) 0 (B) $\pi/4$ (C) $\pi/3$ (D) $\pi/2$
15. The minimum number of points needed to determine a sphere is
- (A) 4 (B) 3 (C) 2 (D) 1

16. $\int_0^\infty \int_0^\infty \frac{e^{-y}}{y} dy dx$ is also equal to

- (A) $\int_0^\infty \int_0^\infty \frac{e^{-y}}{y} dy dx$ (B) $\int_0^\infty \int_0^y \frac{e^{-y}}{y} dy dx$
(C) $\int_0^\infty \int_0^\infty \frac{e^{-x}}{x} dx dy$ (D) $\int_0^\infty \int_0^y \frac{e^{-x}}{x} dx dy$



17. If $a > 0$, then the integral $\int_a^{\infty} \sin x \, dx$
- (A) converges (B) diverges
(C) neither converges nor diverges (D) is equal to ± 1
18. $\frac{dy}{dx}$ of $y = \int_0^{x^2} \cos t \, dt$ is
- (A) $2x \cos x^2$ (B) $2x \sin x^2$ (C) $2x \sin 2x$ (D) $2x \cos 2x$
19. The equation of the tangent to the curve $x = t \cos t$, $y = t \sin t$ at the origin is
- (A) $y = 0$ (B) $x = 0$ (C) $x = y$ (D) $x = -y$
20. Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a differentiable function and $f(1) = 4$. Then the value of $\lim_{x \rightarrow 1} \int_4^{f(x)} \frac{2t}{x-1} \, dt$ is
- (A) $f'(1)$ (B) $2f'(1)$ (C) $4f'(1)$ (D) $8f'(1)$
21. Let $\{f_n\}$ be a sequence of continuous functions on $[0, 1]$ converging pointwise to a function f on $[0, 1]$. For f to be continuous on $[0, 1]$, the uniform convergence of $\{f_n\}$ to f on $[0, 1]$ is
- (A) sufficient, but not necessary (B) necessary, but not sufficient
(C) necessary and sufficient (D) neither necessary nor sufficient
22. For the series $\sum_{n=1}^{\infty} \frac{e^{inx}}{n}$, x in $[0, 2\pi]$, which of the following statements hold ?
- (A) The series converges uniformly on the closed interval $[0, 2\pi]$
(B) The series converges uniformly on the open interval $(0, 2\pi)$
(C) The series converges uniformly on compact subsets of $[0, 2\pi]$
(D) The series converges only at a finite number of points in $[0, 2\pi]$
23. Let $\{f_n\}, \{g_n\}$ be two sequences of complex valued functions on a set S , each converging uniformly on S . Then which of the following statements is not necessarily true ?
- (A) $\{f_n + g_n\}$ is uniformly bounded on S (B) $\{f_n g_n\}$ is uniformly bounded on S
(C) $\{f_n + g_n\}$ is uniformly convergent on S (D) $\{f_n g_n\}$ is uniformly convergent on S



24. From the following sequences of functions, pick the sequence which is uniformly convergent on $[0, 1]$.
(A) $\{x^n\}$ (B) $\{(x - 1) x^n\}$ (C) $\{(x + 1)x^n\}$ (D) $\{(1 + x^2) x^n\}$
25. If the radius of convergence of the power series $\sum_{n=0}^{\infty} a_n z^n$ is 2, then the radius of convergence of the power series $\sum_{n=0}^{\infty} a_n z^{n^2}$ is
(A) 2 (B) $\sqrt{2}$ (C) 4 (D) 1
26. Let e^z denote the exponential function. For $z = x + iy$ in \mathbb{C} , $|e^z|$ has the value
(A) 1 (B) $e^{|z|}$ (C) e^x (D) e^{-y}
27. Pick the region in which there does not exist an analytic branch of the logarithm.
(A) $\{z : |z - 1| < 1\}$ (B) $\{z : 0 < |z| < 1\}$
(C) $\emptyset \sim \{z : z \leq 0\}$ (D) $\emptyset \sim \{z : z \geq 0\}$
28. Suppose a function f defined on a disk D has a power series expansion on D . Then which of the following statements is false ?
(A) f is analytic on D
(B) f is infinitely many times differentiable on D
(C) f does not have a primitive in D
(D) $\exp \{f(z)\}$ is analytic on D
29. The function $\frac{z^6 - 1}{(z - 1)^2}$ ($z \in \mathbb{C}$, $z \neq 1$) has at $z = 1$
(A) a simple pole (B) a removable singularity
(C) a pole of order 2 (D) an essential singularity
30. Which of the following subsets of $I = [0, 1]$ has a positive Lebesgue measure ?
(A) $\{x \in I : x \text{ has a decimal expansion } x = a_1, a_2, \dots$
with $a_n = 0$ for $n > 1000\}$
(B) $\{x \in I : x \text{ has a ternary expansion } x = \frac{a_1}{3} + \frac{a_2}{3^2} + \dots$
with $a_n = 0$ or $1\}$
(C) $\{x \in I : x \text{ has a binary expansion}\}$
(D) all rational points in $[0, 1]$



31. Let $\alpha(x) = \frac{1}{2}$ on $\left[0, \frac{1}{2}\right]$

$$= -\frac{1}{2} \text{ on } \left(\frac{1}{2}, 1\right]$$

Then $\int_0^1 x^2 d\alpha(x)$ has the value

- (A) 0 (B) $\frac{1}{2}$ (C) $-\frac{1}{2}$ (D) $-\frac{1}{4}$

32. Let f be defined on $[0, n]$ where n is a positive integer by

$$f(x) = k \text{ if } k-1 < x \leq k, k = 1, 2, \dots, n \text{ and } f(0) = 0.$$

Let $\alpha(x) = [x]$ be the greatest integer function. Then $\int_0^n f(x) d\alpha(x)$ has the value

- (A) $n(n-1)$ (B) n^2 (C) $n(n+1)$ (D) $\frac{n}{2}(n+1)$

33. Let $\{f_n\}$ be a sequence of non-negative measurable functions on a measurable set E of \mathbb{R} . Suppose $f_n(x) \rightarrow f(x)$ almost everywhere on E . If

$$\alpha = \int_E f(x) dx \text{ and } \beta = \liminf_E \int_E f_n(x) dx, \text{ then}$$

- (A) $\alpha < \beta$ (B) $\alpha \leq \beta$ (C) $\beta \leq \alpha$ (D) $\beta < \alpha$

34. If γ is the positively oriented unit circle, then $\int_{\gamma} \frac{e^z}{z} dz$ has the value

- (A) 0 (B) 1 (C) $2\pi i$ (D) $-2\pi i$

35. If $\gamma(t) = 1 + 2e^{it}$, $0 \leq t \leq 2\pi$, then $\frac{1}{2\pi i} \int_{\gamma} \frac{z^2 + 3}{z-2} dz$ has the value

- (A) 0 (B) 1 (C) 7 (D) 5

36. If $|a| < 1$, the Mobius transformation $\frac{z-a}{1-\bar{a}z}$ maps the disk $D = \{z: |z| < 1\}$ onto

- (A) D (B) a proper subset of D
 (C) $2D$ (D) The upper half plane



37. Let f be analytic in the disk $\{z:|z|<1\}$ with $f(0) = 0$ and $|f(z)| \leq 1$ for all z in the disk. Then which of the following statements does not hold ?
- (A) $\left|f\left(\frac{1}{4}\right)\right| \leq \frac{1}{4}$ (B) $|f'(0)| \leq 1$ (C) $\left|f\left(\frac{1}{2}\right)\right| > \frac{1}{2}$ (D) $\left|f\left(-\frac{1}{2}\right)\right| \leq \frac{1}{2}$
38. Let f be an entire function with $f(z) \rightarrow 1$ as $|z| \rightarrow \infty$. Then $f(0)$ has the value
- (A) 1 (B) -1 (C) 0 (D) 2
39. Let $f = u + iv$ be analytic on the unit disk D with $f(0) = 1$. If $v(x, y) = 2xy$ for $x + iy$ in D , then $u(x, y)$ is equal to
- (A) $x^2 - y^2$ (B) $x^2 + y^2$ (C) $x^2 - y^2 + 1$ (D) $x^2 - y^2 - 1$
40. A Mobius transformation different from identity has
- (A) atmost one fixed point (B) atleast two fixed points
(C) atmost two fixed points (D) no fixed point
41. Which of the following is an irreducible polynomial over Z_2 ?
- (A) $x^3 + 1$ (B) $x^4 + x^2 + x + 1$ (C) $x^4 + x^2 + 1$ (D) $x^4 + x + 1$
42. Let $f(x)$ and $g(x)$ be polynomials of degree 5 over a field F . Which of the following is a possible degree of $f(x) + g(x)$?
- (A) 10 (B) 8 (C) 6 (D) 4
43. Which of the following is a zero divisor in the ring Z_{10} ?
- (A) 3 (B) 5 (C) 7 (D) 9
44. Let D be a Euclidean domain with Euclidean valuation ε . Let $a, b \in D$ with $\varepsilon(a) = \varepsilon(b)$. Which of the following is necessarily true ?
- (A) $a = b$ (B) $ab = 1$
(C) $a = bc$ for some $c \in D$ (D) none of the above
45. Which of the following is an integral domain ?
- (A) Z_4 (B) Z_5 (C) Z_6 (D) Z_{10}
46. Let $\varphi: Z \rightarrow Q$ be a homomorphism of rings where Z is the ring of integers and Q is the ring of rationals. Suppose that $\varphi(z) \neq 0$. Then which of the following is true about $\text{Ker } \varphi$?
- (A) $\text{Ker } \varphi = \langle p \rangle$ where $\langle p \rangle$ is the ideal generated by a prime p
(B) $\text{Ker } \varphi = \langle m \rangle$ where m is a non-prime
(C) $\text{Ker } \varphi = (0)$
(D) $\text{Ker } \varphi = Z$



47. The characteristic of the field of complex numbers is
(A) 0 (B) 1
(C) 2 (D) 3
48. Let a be algebraic and b be transcendental over a field F . Then which of the following is not true ?
(A) ab is transcendental (B) $a + b$ is transcendental
(C) $a + b$ is algebraic (D) $a^2 + b^2$ is transcendental
49. The degree of the splitting field of $x^3 - 2$ over \mathbb{Q} is
(A) 2 (B) 3 (C) 5 (D) 6
50. Which of the following pairs of fields are isomorphic. (Here \mathbb{C} is the field of complex numbers \mathbb{R} is the field of reals and \mathbb{Q} is the field of rationals. Also x is an indeterminate)
(A) \mathbb{C} and \mathbb{R} (B) \mathbb{Q} and $\mathbb{Q}(\sqrt{2})$
(C) $\mathbb{Q}(x)$ and $\mathbb{Q}(x^2)$ (D) $\mathbb{Q}(x)$ and $\mathbb{R}(x)$
51. Which of the following sets are linearly independent in \mathbb{R}^3 ?
(A) $\{(1, 2, 1), (1, 3, 1), (1, 4, 1)\}$
(B) $\{(2, 4, 2), (2, 5, 2), (2, 6, 2)\}$
(C) $\{(3, 4, 3), (3, 5, 5), (3, 6, 7)\}$
(D) $\{(3, 1, 3), (4, 1, 4), (1, 1, 2)\}$
52. Let V be the vector space of all polynomials of degree ≤ 5 over the reals \mathbb{R} . Then dimension of V is
(A) 5 (B) 6 (C) 10 (D) 12
53. Let V be the space of all polynomials of degree ≤ 3 over \mathbb{R} . Which of the following is a subspace of V ?
(A) $\{f(x) \in V : f(0) = 1\}$ (B) $\{f(x) \in V : f(1) = 1\}$
(C) $\{f(x) \in V : f(1) = 0\}$ (D) $\{f(x) \in V : f(1) \neq 0\}$
54. Which of the following is an eigen value of the matrix $\begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$?
(A) 0 (B) 2
(C) 3 (D) 4



55. Which of the following pairs of matrices are conjugates of each other ?

(A) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ and $\begin{bmatrix} 2 & 1 \\ 0 & 2 \end{bmatrix}$

(B) $\begin{bmatrix} 2 & 1 \\ 0 & 2 \end{bmatrix}$ and $\begin{bmatrix} 4 & 1 \\ 0 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & 1 \\ 0 & 3 \end{bmatrix}$ and $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 1 \\ 4 & 1 \end{bmatrix}$ and $\begin{bmatrix} 3 & 0 \\ 0 & -1 \end{bmatrix}$

56. Which of the following is an even permutation ?

(A) (1 2 3 4)

(B) (1 2 3) (2 4)

(C) (1 2 3) (1 3 4)

(D) (1 2) (1 3 4)

57. The number of homomorphisms from the cyclic group Z_5 to the cyclic group Z_6 is

(A) 1

(B) 2

(C) 3

(D) 4

58. The number of subgroups of order 5 in a group of order 20 is

(A) 1

(B) 2

(C) 5

(D) 6

59. Let S_5 be the symmetric group and A_5 be the alternating group on 5 symbols.

Let $\varphi: A_5 \rightarrow S_5$ be a non-trivial homomorphism. Then which of the following is true ?

(A) φ is one-to-one

(B) φ is onto

(C) $\text{Im } \varphi$ contains odd permutations

(D) $\text{Im } \varphi$ is a subgroup of index 5 in S_5

60. The order of the element $\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{bmatrix}$ in the multiplicative group of non singular

3×3 matrices is

(A) 2

(B) 3

(C) 4

(D) infinite

61. Let \mathbb{R}^3 be the metric space with Euclidean metric. Which of the following is not a point on the unit circle in \mathbb{R}^3 ?

(A) (1, 0, 0)

(B) $\left(\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}\right)$

(C) (1, 0, 1)

(D) $\left(\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}, 0\right)$



62. Let $C[0, 1]$ be the metric space of all continuous real valued functions on $[0, 1]$; with supremum metric. Let $z \in C[0, 1]$ be defined by $z(t) = 0$ for all $t \in [0, 1]$. Which of the following belongs to the open ball of radius 1 centered at z ?
- (A) $f(t) = t^2$ (B) $f(t) = 1+t$ (C) $f(t) = \frac{t^2+1}{3}$ (D) $f(t) = \frac{t+1}{2}$
63. Let $f_n(t) = \begin{cases} \frac{1}{n} & : t \leq \frac{1}{n} \\ 0 & : t > \frac{1}{n} \end{cases}$ be a sequence in $C[0, 1]$. Which of the following is true?
- (A) f_n converges to $f(t) = 0$ (B) f_n converges to $f(t) = 1$
 (C) f_n converges to $f(t) = \frac{1}{2}$ (D) f_n is not convergent
64. Which of the following is not a complete metric space?
- (A) \mathbb{R}^2 with Euclidean metric
 (B) \mathbb{R}^2 with discrete metric
 (C) $C[0, 1]$ with supremum metric
 (D) $P[0, 1]$ of all polynomials with supremum metric
65. Let \mathbb{R} be the set of reals, \mathbb{Q} the set of rationals and \mathbb{S} be the set of all irrationals. Let τ be a topology on \mathbb{R} given by $\tau = \{\mathbb{R}, \mathbb{Q}, \mathbb{S}, \phi\}$. Let $A = \{1\}$ then $\overline{A} =$
- (A) A (B) \mathbb{R} (C) \mathbb{S} (D) \mathbb{Q}
66. Let $X = \{1, 2, 3, 4, 5\}$ and $\tau = \{X, \phi, \{1, 2, 3\}, \{2, 3\}\}$. Then the interior of $A = \{2, 3, 4, 5\}$ in (X, τ) is
- (A) A (B) $\{2, 3\}$ (C) $\{1, 2, 3\}$ (D) ϕ
67. Which of the following pairs of topological spaces are homeomorphic? All spaces have topology induced by Euclidean metric.
- (A) $(0, 1)$ and \mathbb{R} (B) $(0, 1)$ and $[0, 1]$
 (C) $[0, 1]$ and \mathbb{R} (D) $[0, 1]$ and $[0, \infty]$
68. Let X, Y be topological spaces and $f: X \rightarrow Y$ be a continuous map. Which of the following is not necessarily true?
- (A) $f^{-1}(A)$ is closed in X whenever A is closed in Y
 (B) $f(B)$ is closed in Y whenever B is closed in X
 (C) $\{f(x_n)\}$ is convergent whenever (x_n) is convergent
 (D) $f(\overline{A}) \subseteq \overline{f(A)}$ for all subsets A of X



69. Let X be a connected space with infinitely many points and Y be the two points discrete space $\{0, 1\}$. Let $f : X \rightarrow Y$ be continuous with $f(x) = 1$ for some $x \in X$. Then which of the following is true ?
- (A) $f(y) = 1$ for all $y \in X$ (B) $f(y) \neq 1$ whenever $y \neq x$
(C) f is one-to-one (D) f is onto
70. Let X be the two points discrete space $X = \{0, 1\}$. Let Y be a connected space with $|Y| > 2$. Which of the following is true about $X \times Y$?
- (A) $X \times Y$ is connected
(B) $X \times Y$ is disconnected with exactly two components
(C) $X \times Y$ is disconnected with exactly three components
(D) There is a disconnection of $X \times Y$ separating any two points z_1 and z_2
71. Let C be the field of complex numbers and A be the linear operator on the complex vector space C^2 defined by $A(x_1, x_2) = (x_2, -x_1)$. Let I be the identity operator. Then the null space of $A - I$ is the span of
- (A) $\{(1, -i)\}$ (B) $\{(1, -1)\}$ (C) $\{(1, i)\}$ (D) $\{(1, 1)\}$
72. Let X be a normed linear space. Then a subspace Y of X is bounded iff
- (A) $Y = \{0\}$ (B) Y is finite dimensional
(C) Y is infinite dimensional (D) $Y \neq \bar{Y}$
73. Let X be the normed linear space C_{00} with norm $\| \cdot \|_{\infty}$. Then \bar{X} is
- (A) C (B) C_0 (C) C_{00} (D) l^{∞}
74. The Hilbert space in which the Legendre polynomials are orthogonal is
- (A) $L^2[-\pi, \pi]$ (B) $L^2\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ (C) $L^2[-1, 1]$ (D) $L^2[0, \infty]$
75. Let H be the complex Hilbert space of square summable sequences of complex numbers and let $e_j = (0, 0, \dots, 0, 1, 0, \dots)$, where 1 occurs in the j^{th} coordinate. If $x = (1, 2, \dots, 100, 0, 0, \dots)$, then $\sum_{j=1}^{\infty} |\langle x, e_j \rangle|^2$ is
- (A) 100 (B) 100^2
(C) $1+2+3+\dots+100$ (D) $1^2 + 2^2 + \dots + 100^2$



76. Let $X = C[-1, 1]$ with L^2 - innerproduct and $S = \{f \in X : f(-t) = f(t) \forall t \in [-1, 1]\}$. Then S^\perp is
- (A) $\{0\}$
 (B) X
 (C) $\{f \in X : f(t) = c \forall t \in [-1, 1], \text{ where } c \text{ is a constant}\}$
 (D) $\{f \in X : f(-t) = -f(t) \forall t \in [-1, 1]\}$
77. Let X be an innerproduct space and for $x, y \in X$, $f(x) = f(y)$ for every $f \in X'$. Then
- (A) $x = y = 0$ (B) $x = y$ (C) $x \perp y$ (D) $x = -y$
78. Let H be a Hilbert space. If $x, y \in H$ are such that $\|x\| = 6$, $\|x + y\| = 16$ and $\|x - y\| = 4$, then $\|y\|$ is
- (A) 2 (B) 8 (C) 10 (D) 12
79. Let H be the complex Hilbert space C^3 , where C is the field of complex numbers.

If a linear operator A on H is represented by the matrix $\begin{bmatrix} 1 & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & -i \end{bmatrix}$ with respect

to the standard basis, then A^* (the adjoint of A) is represented by the matrix.

(A) $\begin{bmatrix} -1 & 0 & 0 \\ 0 & -i & 0 \\ 0 & 0 & i \end{bmatrix}$

(B) $\begin{bmatrix} -1 & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & -i \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & -i \end{bmatrix}$

(D) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -i & 0 \\ 0 & 0 & i \end{bmatrix}$

80. Let R^2 and R be the normed linear spaces with the Euclidean norm, where R is the field of real numbers. If $T : R^2 \rightarrow R$ is defined by $T(x_1, x_2) = x_1$ then
- (A) T is bounded but not open
 (B) T is open but not bounded
 (C) T is bounded and open
 (D) T is neither bounded nor open