ARULMIGU PALANIANDAVAR ARTS COLLEGE FOR WOMEN, PALANI

DEPARTMENT OF MATHEMATICS

Learning Resources
Title of the paper: REAL ANALYSIS

Prepared By
Dr.K.Meena, Associate Professor and Head

ONE MARK QUESTIONS WITH ANSWERS

REAL ANALYSIS

1. Two sets A and B are equivalent if There exists a -----------from A to B
a) injection b) bijection c)surjection d) homomorphism. Ans: b) bijection
2. Let N ={1,2,3…n…} and E={2,4,…2n,…}
The correct statement is ------- a) N and E are equivalent sets b) N and E are equal s c) N and E are infinite sets d) N and E are finite sets Ans: a) N and E are equivalent sets
3. The incorrect statement from the following statement is ---------
a) E={2,4,…2n…} is a countable set b) Z is a countable set c) N is a countable set d) R is a countable set Ans: d) R is a countable set
4. The incorrect statement from the following statement is ---------
a) NXN is a countable set b) Q is a countable set c) N is a countable set d) R is a countable set Ans: d) R is a countable set
5. The incorrect statement from the following statement is ---------
a) (0,1]is uncountable b) [0,1] is uncountable c) Q is uncountable
d) {0}∪{1}∪{2} is uncountable Ans: d) {0}∪{1}∪{2} is uncountable
6. The set {2,4,…2n…} is ----- a) countable b) uncountable c) finite d) noneAns: a) countable

Say True or False

7. Every finite set can be equivalent to a proper subset of itself Ans: False
8. Every infinite set can be equivalent to a proper subset of itself Ans: True
9. A set A is said to be countably infinite if A is ----- to the natural numberN Ans: equivalent

10. **A is said to be countable if it is ----- Ans: finite or countably infinite**
11. **The countable set is ------a) [0,1] b) R c) Q d) C Ans: c) Q**
12. **Q is ------ in R**
a) open b) closed c) not open d) uncountable Ans: c) not open
13. **In any metric space (M,d) the diameter of the empty set Φ is ------**
a) 0 b) 1 c) ∞ d) -∞ Ans: -∞
14. **In a metric space (M,d) Let A⊆M. The diameter of A denoted as d(A) is defined as ----**
a) g.l.b {d(x,y)/x,y∈A} b) l.u.b {d(x,y)/x,y∈A}
c) g.l.b {d(x,y)/x∈A,y∈A} d) l.ub {d(x,y)/x,yεA}
Ans: b) l.u.b {d(x,y)/x,y∈A}
15. **The diameter of any non empty subset in a discrete metric space is -------**
a) 0 b) ∞ c) -∞ d) 1 Ans: d) 1
16. **In a discrete metric space M the diameter of A={1,5,7,9} is--------**
a) 0 b) 1 c) 9 d) 8 Ans: d) 8
17. **In (R,d) The diameter of [0,1]∩[2,3]=-------**
a) 0 b) -∞ c) 4 d) 3 Ans: b) -∞
18. **In R with usual metric for aϵR open ball B(a,r)=--------**
a) (a-r,a+r) b) [a-r,a+r] c) (a-r,a+r] d) [a-r,a+r) Ans: a) (a-r,a+r)
19. **In [0,1] with usual metric for open ball B(0,1/4)=--------**
a) (-1/4,1/4) b) [0,1/4) c) (-1/4,0) d) (0,1/4) Ans: b) [0,1/4)
20. **If M is In a discrete metric space Then B(a,2) =-------**
a) {0} b) M c) Φ d) 2 Ans: b) M
21. **In R with usual metric [a,b) is ----------**
a)Closed b) open c) either closed or open d) neither closed nor open
Ans: d) neither closed nor open
22. **In R with usual metric every singleton set is ------Ans: closed**
23. **In R with usual metric every closed ball is a -------Ans: closed set**
24. **The set of irrational numbers in R is -------**
a)Closed b) open c) complete d) dense Ans: d) dense
25. **The set of all limit point s of A is called the -------of A .**
Ans: derived set
26. **If A= {0,1,1/2,1/3,…1/n,…} then the derived set of A denoted by D(A) is ------ a) 1 b) {0} c) A d) {0,1} Ans: b) {0}**
27. **A subset A of a metric space M is said to be ------in M if A=M .**

Ans: dense

28. A metric space M is said to seperable if -------Ans: there exists a countable dense subset in M.

<u>Say True or False</u>

29. A set is closed iff it contains all its limit points –Ans: True

30. A set A is closed iff A=A Ans: True

31. In R with usual metric Q is dense Ans: True

32. R with discrete metric is seperable Ans: False

33. In a discrete metric space no proper subset is dense Ans: True

34. A metric space M is said to be complete if every Cauchy sequence in M ------------- Ans: converges to a point in M

35. The metric space (0,1] with usual metric is -------

a) complete b) not complete c) closed d) none Ans: b) not complete

36. A subset A of a complete metric space M is complete if A is ------ Ans: closed

37. State Baire's category theorem Ans: Any complete metric space is Second category

<u>Say True or False</u>

38. A subspace of a complete metric space is complete . Ans: False

39. Any metric space which is of second category is complete. Ans: False

40. Any discrete metric space is of second category. Ans: True

41. If f is continuous function from a metric space M_1 to a metric space M_2 then ------ a) A is open in M_1 ==> f(A) is open in M_2

b) A is closed in M_1 ==> f(A) is closed in M_2

c) A is open in M_2 ==> $f^{-1}(A)$ is open in M_1 d) If $A \subseteq M_1$,

then f(A) =f(A). Ans: c) A is open in M_2 ==> $f^{-1}(A)$ is open in M_1

42. Composition of two continuous function is ---- Ans: continuous

43. In usual metric there exists a continuous function from ------

a) (0,1) onto [0,1] b) (0,1) onto R c) [0,1] onto (0,1) d) (0,1) onto Q

Ans: b) (0,1) onto R

44. A function f: $M_1 \rightarrow M_2$ is said to be an ------- if f(G) is open in M_2 for every set G in continuous. Ans: open map

45. R with usual metric is not homomorphic to R with ---------- Ans: discrete metric

46. A continuous function f: $M_1 \rightarrow M_2$ need not be ------on M_1.

Ans: uniformly continuous

47. A function whose domain is a discrete metric space is -----

Ans: continuous

48. If f: $M_1 \rightarrow M_2$ is a homeomorphism thenf is continuous and an -----

Ans: open map

49. If f: $M_1 \rightarrow M_2$ is a homeomorphism then f and f^{--1} are -----

Ans: continuous

50. If f: $M_1 \rightarrow M_2$ is uniformly continuous on M_1 then f is ------

Ans: continuous at every point on M_1

51. If f: $M_1 \rightarrow M_2$ is a homeomorphism then f^{-1} is --------

Ans: homeomorphism.

52. Any isometry from one metric space to another is a -------

Ans: homeomorphism.

53. If f : R----->R defined by $f(x) = x^2$ is continuous but not --------on R.

Ans: uniformly continuous.

Say True or False

54. If f : R----->R defined by f(x) = kx, x$\in$ R uniformly continuous

Ans: True

55. If f: [0, 1] ------>R defined by $f(x) = x^3$ uniformly continuous.

Ans: True

56. Any open intervals in R are homeomorphic. Ans: True

57. If f: [0, 1] ------>R defined by $f(x) = x^2$ uniformly continuous [0,1].

Ans: True

58. If f : R----->R & g : R----->R are uniformly continuous then fg uniformly continuous . Ans: False

59. Any homeomorphism from one metric space to another is a isometry.

Ans: False

60. If f: $M_1 \rightarrow M_2$ is a continuous bijection then $f^{-1} : M_2 \rightarrow M_1$ is also continuous. Ans: False

61. Let [1, 2]$\cup$[3,4] with usual metric Then M IS ---------- a) connected b) disconnected c) compact d) none Ans: b) disconnected

62. R is ------- a) compact b) connected c) disconnected d) noneAns: c) disconnected

63. Any discrete metric space M with more than one point is ------------------ a) compact b) connected

c) disconnected d) none Ans: c) disconnected

64. M is connected iff every continuous function f : M-------> (0,1) is --------- Ans : not onto.

65. A subspace of R is connected iff --------------Ans: it is an interval

66. A subspace of a connected metric space -------a) connected b) need not be connected c) is finite d) is countable .
Ans : b) need not be connected

67. Let f be real valued continuous function defined on an interval I. Then f takes every value between any two values it assumes. This statement is known as ---------- Ans: The intermediate value theorem.

68. If f is non-constant real valued continuous function on R Then the range of f is -------Ans: uncountable

69. $A = \{ (x, y) / x^2+y^2=1\}$ is a --------- subset of R^2Ans: connected.

70. [0, 1] is -------------- subset of R with discrete metric a) connected b) compact c) not a connected d) none Ans: not a connected

71. If A and C are connected subset of metric space M and if $A \subseteq B \subseteq C$, Then B is ------- Ans: connected

72. Union of two connected sets ---------Ans: need not be connected.

73. Which of the following is a connected subset of R with usual metric ?
a) N b) R c) $(0, 1)\cup(1, 2)$ d) Z Ans: b) R

Say True or False

74. R is connected. Ans: True

75. Q is connected. Ans: False

76. A subspace of a connected subsets of a metric space M, then $A\cup B$ is connected. Ans: False

78. If A and B are connected subsets of M and $A\cap B \neq \Phi$ then $A\cup B$ is connected .Ans: True

79. If M is a metric space and $x \in M$ then {x} is a connected subset of M.
Ans: True

80. Continuous image of a connected set is connected. Ans: True

81. Which of the following is a compact subset of R with usual metric ?
a) N b) R c) [0, 5] d) {1,1/2, 1/3 ,…1/n,…} Ans: c) [0, 5]

82. Which of the following is a compact metric space with usual metric ?
a) R b) (0, 1) c) $[0, \infty)$ d) [0, 1] Ans: d) [0, 1]

83. A closed subspace of a compact metric space is -------Ans: compact.

84. If A and B are two compact subsets of a metric space M. Then $A \cup B$ is ----
Ans: compact.
85. Write Heine Borel theorem
Ans: Any closed interval [a, b] is a compact subset of R.
86. A subset A of R is compact iff ------- Ans: A is closed and bounded.

87. Let A be a subset of metric space M .If A is totally bounded then A is ----
Ans: bounded.
88. Let A be totally bounded subset of R. Then A is --------Ans: compact.
89. Continuous image of a compact metric space is ----- Ans : compact.
90. Any infinite subset of a compact metric space has a -------
Ans: Limit point
91. Any continuous function defined on a compact metric space is ---------
Ans: uniformly continuous.
92. Any closed and bounded subset of R is -----------Ans: compact.
Say True or False
93. Any compact metric space is complete . Ans: True
94. Any totally bounded metric space is compact. Ans: False
95. Any closed and bounded subset of a metric space is compact. Ans: False
96. Any totally bounded and complete metric space is compact. Ans: True
97. A bounded infinite subset of R has a limit point. Ans: True
98. Any totally bounded metric space is separable. Ans: True
99. Any compact metric space is separable. Ans: True
100. Any continuous real valued function defined on [a, b] is bounded.
Ans: True

KMeena

Staff in charge