① Which of the following Sets is/are Closed?

Ans: ii. $Y = (-\infty, 0] \cup [1, \infty)$ and iv. $V = [a, b]$

② Let A be a Subset of a topological Space. A Point x in X is a ..... of A is every neighborhood of x intersects A in a point Other than x.

Ans: Limit point

③ let (X, d) and (Y, d) be metric Spaces and f a mapping of X into Y. let τ and τ_1 be the topologies determined by d and d_1 respectively Then $f: (X, \tau) \to (Y, \tau)$ is Continuous if and Only if $x_n \to x \Rightarrow f(x_n) \to f(x)$. which of the following is/are true?

Ans:

④ if $f: X \to Y$ is a homeomorphism and X is Hausdorff, then Y is

Ans: Hausdorff

⑤ if X is a path Connected space, then it is.....

ans: Connected.

⑥ let $\{f_n\}$ be a Sequence of Continuous functions from a metric Space (X, d) to a metric Space (Y, P). Suppose that $\{f_n\}$ Converges uniformly to f from X to Y then

ans: f is Continuous.

⑦ Which of the following is/are true? i A Subset of a finite set is a finite set. ii A finite union of finite sets is a finite set. iii A product of finite sets is a finite set iv A Subset of a Countable set is a Countable set

Ans: All the above.

⑧ Let $X = R$ and d be the discrete metric. Let $Y = R$ and P be the usual (Euclidean) metric. if we define $f: X \to Y$ by $f(x) = x$ then f is Continuous but there exist open sets U in X such that

Ans:

⑨ if $f: X \to Y$ is a homeomorphism and X is Hausdorff, then Y is ....
ans: Hausdorff

⑩ if τ_1 and τ_2 and two topologies on non-empty set X, then ... is topological space

Ans: $\tau_1 \cap \tau_2$

⑪ Let B be a basis on a set X. the topology T generated by B is obtained by defining the open sets to be the empty set and every set that is equal to a .... of basis elements.

Ans: Union

⑫ let (X,τ) be ~~~~ space and $A = \{x_1, x_2, \ldots, x_n\}$ any finite Subset of (X,τ). Then

Ans:

⑬ Given a topological space X, a .... A in X is a non-empty, regularly Closed, Proper Subset of X that has a connected interior

Ans:

⑭ Assume that $f: X \to Y$ is continuous and X is path Connected. Then $f(X)$ is a path ...... subspace of Y

Ans: Connected

⑮ if τ is a topology on non-empty set X, then arbitrary .... of members of τ belong to τ

Ans: ~~intersec~~ Union

⑯ Let X be a Hausdorff topological space and A be compact in X. Then A is .... in X

Ans: Closed

⑰ According to interpolation Inequality for e^x, if $t \in [0,1]$

Ans:

⑱ A topological space X is called .... if the Components of X are the one - point Subsets of X

ans: Bounded

(19) Let A be a subset of a topological space. A point x in X is a ... of A if every neighborhood of x intersects A in a point other than x

Ans: Limit point.

(20) if (X,d) is a metric space, $Y \subset X$ and $Y \subset (Y,d)$ is complete then

Ans: Y is closed

(21) Let X be a topological space which of the following statements about the collection of closed sets in X hold:

Ans: I and III only

(22) A set $A \in \mathbb{R}^n$ is called ... if there exits $b \in \mathbb{R}$ such that $|x| \leq b$ for all $x \in A$

Ans: bounded

(23) A subset A of a discrete space (X,τ) is compact if and only if it is

ans: finite

(24) A norm is a function $\|\cdot\|: X \to \mathbb{R}$ having the following properties:

ans: I, II and IV only

(25) if x_n is convergent, then

ans: x_n is a Cauchy sequence

(26) let x be a non-empty set. A function $f: X \to \mathbb{R}$ is bounded if

ans: $|f(x)| \leq M$ for some M and all $x \in X$

(27) let $X = \{a,b,c,d,e\}$ following is not a topology on X

ans: $\tau_1 = \{X, \emptyset, \{a\}, \{c,d\}, \{a,c,e\}, \{b,c,d\}\}$

(28) Asume a,b,p,q are real numbers, with $b \geq 0, 1 < p < \infty$, and $p, q > 1$ with $1/p + 1/q = 1$,

Ans: $ab \leq \frac{p-1}{p} a^{\frac{p}{p-1}} + \frac{1}{p} b^p$

(29) if X and Y are compact topological spaces, then the product $X \times Y$ is compact

Ans: True

(30) Consider $A=[0,1)$ as a subset of $\mathbb{R}$ with the standard topology then the closure of A is ...
ans: $[0,1]$

(31) R with the usual topology is a compact topological space.
ans: False

(32) Let $X=\{a,b,c,d,e,f\}$ which of the following is a topology on X
ans: $\tau_1=\{X,\emptyset,\{a\},\{c,d\},\{a,c,d\},\{b,c,d,e,f\}\}$.

(33) if is a homeomorphism and is another homeomorphism, then the composition is also a homeomorphism. True or False?
Ans: True

(34) Let A be a subset of a topological space X, and let A' be the set of limit points of A. Then the closure of A, Cl(A) is
ans: $Cl(A)=A\cup A'$

(35) Let (X,d) and (Y,ρ) be metric spaces. A function $f:X\to Y$ is continuous if and only if
Ans: $f^{-1}(U)$ is closed in Y whenever U is open in X

(36) Let X be a metric space. Then the union of a finite collection of
Ans: Closed sets $A_1,\ldots,A_k$ is Closed

(37) Let X be a topological space and $x\in X$. An open set U containing x is said to be a ... of X
ans: Neighborhood

38) if X is a path connected space, then it is ...
ans: Connected.

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(39) A Subset A of a topological space X is called densed

Ans: $Cl(A) = X$

(40) A Compact subset of R is

ans: Bounded

(41) A topological space X is..... if and only if there are no non-empty proper subsets of X that are both open and closed in X

Ans: Connected

(42) A set $A \in R^n$ is called .... if there exits $b \in R$ such that $|x| \leq b$ for all $x \in A$.

Ans: A Closed set

(43) A Subset S of R is open if and only if it is a union of open intervals

Ans: True

(44) A Subset A of a discrete space (X, τ) is compact if and only if it is

Ans: finite

(45) A disconnected metric space is one that can be expressed as a union of

ans: two disjoint non-empty open subset

(46) A function $f: R \to R$ is said to be continuous if for each $a \in R$ and each positive real number ε, there exists a positive real number δ such that

ans: $A(|x-a| < \delta - |\delta(\varepsilon) - f(a)| < \varepsilon)$

(47) A Subset A of a topological space X is closed if the .... is open

ans: $X - A$

(48) A topological space X is .... if every open cover of X has a finite subcover

ans: Compact

(49) A topological space (X) is Hausdorff if for every pair of distinct point (x) and (y) in (X), there exist a joint neighborhoods (U) and (V) of (x) and (y) respectively, True or False

ans: True

(50) A metric space X is called ... if every cauchy sequence in X converges to a limit in X

ans: Complete

(51) A set $A \in R^n$ is called .... if for every $p, q \in A$ the line segment between p and q lies in A

ans: Convex

(52) A subset A of X is open if and only if its

ans: Complement A^c is closed in X

(53) A partition of a set X is a collection of mutually disjoint subsents of X whose union is X

ans: True

(54) A set A contained in a topological space X is said to be ..... in X if A is connected in the ____

(55) A subset U of a metric space (X,d) is open in X if for every $x \in U$ there exists $r > 0$ such that ....

ans: $B_r(x) \subseteq U$

(56) A metric space (X,d) is called a connected metric space if and only if (X,d) cannot be expressed as

ans: the union of two disjoint non-empty open subset of itself.