Real Analysis

1. Let $\sum a_n$ be a convergent series of non-negative terms. Then

a) $\lim_{n\to\infty} \inf\{a_n\} = 0$ b) $\lim_{n\to\infty} \sup\{a_n\} = 0$

c) $\lim_{n\to\infty} \inf n.a_n = 0$ b) $\lim_{n\to\infty} \sup\{a_n\} > 0$.

2) Let (X,d) metric space. fix x_0 in X.

Let $f: X \to \mathbb{R}$ ~~be if define dtrsfy~~

$$f(y) := d(x_0, y)$$

Then a) f is bdd b) f is cont

c) f is not necessarily bdd

d) $f(x+y_0) = f(x)$, $\forall x \in X$, y_0 - fixed elt in X.

3. The set $\{\sqrt{3} + x \mid x \in \mathbb{Q}\}$. Then the set is

a) Closed in $\mathbb{R}$ b) open in $\mathbb{R}$ c) both open and closed in $\mathbb{R}$

d) Neither open nor closed in $\mathbb{R}$.

4. Let (X, d_1) - metric space Then which of the followings are metric space ?

a) $1 - d_1(x,y)$, $\forall x,y \in X$

b) $d(x,y) := 1 + d_1(x,y)$

c) $d(x,y) := \dfrac{1 - d_1(x,y)}{1 + d_1(x,y)}$

d) $d(x,y) := \dfrac{1}{1 + d_1(x,y)}$

5. Let $0<q<1$. The sequence $n\left[q+\frac{q}{n}\right]^n$ is

a) Converges to 0 b) Converges to 1

c) Converges to e. d) diverges to ∞.

6. The number of conjugate classes in the symmetric gp S_5 is

a) 5 b) 7 c) 10 d) 25

7. Let G be a gp of order 28. Let H, K be subgp of G of order 4 and 7 respectively Then

a) HK is not a subgp of G b) HK is a proper subgp of G

c) G = HK d) None of these

8. Mark the wrong statement

a) If $d \mid o(G)$, then G has a subgp of order d.

b) If a prime $p \mid o(G)$ Then G has a subgp of order p

c) If $p^r \mid o(G)$, p-prime, r +ve integer, then G has a subgp of order p^r.

d) If $d \mid o(G)$ and G is cyclic then G has a subgp of order d.

9) Which of the followings are true?

a) Any two finite abelian gps of same order are isomorphic

b) Any two infinite cyclic gps are isomorphic

c) Any two infinite abelian gps are isomorphic

d) Any two gp of order four are isomorphic.

10 $A = (0,1]$ in $\mathbb{R}$, w.r.t discrete metric Then which of the followings are true?

a) $A^0 = (0,1]$ b) $A' = (0,1]$ c) $\bar{A} = (0,1]$ d) $\text{Bdry}(A) = \phi$

11. Which of the followings are true?

a) Every conts fn on $\mathbb{R}$ is bdd.

b) Every bdd fn in $\mathbb{R}$ is conts atleast one point.

c) Every bdd conts fn in $\mathbb{R}$ is uniformly conts on $\mathbb{R}$.

d) If $|f(x)| \leq 7 + |x| \ \forall x \in \mathbb{R}$ Then f is conts on $\mathbb{R}$.

12. suppose $\{a_n\} \to 0$ and let $\{y_n\}$ be a seq in $\mathbb{R}$

And if $\forall \varepsilon > 0, \exists n_0 \in \mathbb{N}, \forall n \geq n_0 \ni |a_n - y_n| < \varepsilon$

Then

a) $\{y_n\}$ is convgnt b) $\{y_n\}$ is not necessarily convgnt

c) $\{y_n\}$ is bdd d) $\{y_n\}$ is Cauchy seq.