

List of definitions and theorems

Definitions

1. Set bounded from below, bounded from above. Lower bound, upper bound of a set.
2. Supremum, infimum.
3. Maximum, minimum.
4. Sequence, n th member of a sequence, set of all members of the sequence.
5. Sequence bounded from below, above, bounded.
6. Increasing, decreasing, non-decreasing, non-increasing, monotone, strictly monotone sequence.
7. Sum, difference, product, quotient, λ -multiple of a sequence.
8. Finite or infinite limit of a sequence. Convergent, divergent sequence.
9. Subsequence.
10. Mapping, image, pre-image of an element. Graph, range of the mapping. Image, pre-image of a set.
11. Compound mapping.
12. Onto, one-to-one, bijective mapping.
13. Restriction of a mapping. Inverse mapping.
14. Function increasing, decreasing, non-decreasing, non-increasing, monotone, strictly monotone on an interval.
15. Function bounded, bounded from above, from below.
16. Function even, odd, periodic.
17. Neighbourhood, punctured neighbourhood of a point, of infinities. Left, right neighbourhoods.
18. Limit of a function (finite, infinite). Limit from left, right.
19. Function continuous at a point. Continuous from left, right. Continuous on an interval.
20. Maximum, minimum of a function on a set. Point of maximum, minimum, extrema.
21. Local minimum, local maximum, strict local minimum, strict local maximum with respect to M .
22. Derivative of a function at a point. Derivative from left, right.
23. Tangent to the graph.
24. Convex, concave, strictly convex, strictly concave function.
25. Second derivative.
26. Point lies below/above the tangent.
27. Inflection point.
28. Asymptote.

Theorems

1. Supremum theorem.
2. Archimedean property.
3. Existence of an integer part. **Proof.**

4. n -th root.
5. Density of $\mathbb{Q}$ and $\mathbb{R} \setminus \mathbb{Q}$.
6. Uniqueness of a sequence limit. **Proof.**
7. Boundedness of a convergent sequence. **Proof.**
8. Limit of a subsequence. **Proof.**
9. Arithmetics of limit (of a sequence). **Proof** (i) and (ii).
10. Limits and ordering (of a sequence).
11. Two policemen/sandwich theorem (for sequences). **Proof.**
12. Corollary: bounded and zero sequence.
13. Boundedness of a sequence with infinity limit.
14. Limit of a quotient of sequence, type *something*/0.
15. One policeman.
16. Supremum as a limit. **Proof.**
17. Limit of a monotone sequence.
18. Bolzano–Weierstrass.
19. Uniqueness of a limit (function).
20. Limit and boundedness (function). **Proof.**
21. Arithmetics of limit (of a function).
22. Limit of a quotient of function, type *something*/0.
23. Limits and inequalities. **Proof** (iii).
24. Limit of functions: bounded times zero. **Proof.**
25. Limit of a composition of functions.
26. Heine.
27. Limit of a monotone function.
28. Bolzano intermediate value theorem.
29. Image of an interval under a continuous function.
30. Extrema of continuous function.
31. Boundedness of continuous function. **Proof.**
32. Continuity of an inverse function.
33. Derivative and continuity. **Proof.**
34. Arithmetics of derivatives. **Proof** (i) and (ii).
35. Derivative of compound function.
36. Derivative of inverse function.
37. Necessary condition for a local extremum. **Proof.**
38. Rolle. **Proof.**
39. Lagrange mean value. **Proof.**
40. Sign of the derivative and monotonicity. **Proof** (i).
41. Computation of one-sided derivative.
42. l'Hospital's rule
43. Second derivative and convexity. **Proof** (i).
44. Necessary condition for inflection. **Proof.**

- 45. Sufficient condition for inflection. **Proof.**
- 46. Form of asymptote. **Proof.**