Solution – Quiz 1

(1) What is Bolzano–Weierstrass theorem?

(A) Every convergent sequence is bounded.

(B) Every convergent sequence has a bounded subsequence.

(C) All subsequence of a convergent sequence are bounded.

(D) Every bounded sequence has a convergent subsequence.

(2) Consider sequence whose nth term is given as follows: $a_n = \frac{n^3}{3^n}$.

Then sequence a_n

(A) is convergent to e.

(B) is convergent to 0.

(C) is convergent to 1.

(D) divergent to ∞.

Ans Tutorial Sheet 2 – Question 4 (i).

Put $x = 3$ and $k = 3$.

(3) An increasing sequence which is bounded below:

(A) is always divergent.
(B) is always convergent.
(C) convergent to zero.
(D) may or may not be convergent.

Ans: An increasing sequence is always bounded below.

However.

increasing sequence → if bounded above ⇒ convergent to its supremum.
increasing sequence → if not bounded above ⇒ divergent to infinity.

(4) Find limit of sequence $a_n = \sqrt{n^2+n} - \sqrt{n^2+1} \quad \forall\, n \in N$.

(A) converges to $\frac{1}{3}$.
(B) converges to 1.
(C) converges to $\frac{1}{2}$.
(D) Divergent.

Ans Tutorial sheet 2 — Qus 2 (e).

(5) Find $V_5(.3)$.

(A) $(-4.7, 5.3)$

(B) $(.7, 5.3)$

(C) $(4.7, 5.3)$

(D) $(-4.7, -5.3)$

Ans We know $V_\varepsilon(a) = (a-\varepsilon, a+\varepsilon)$.

So $V_5(.3) = (.3-5, .3+5)$

$= (-4.7, 5.3)$