Q1:

The series $\sum_{n=1}^{\infty} \frac{1}{n \sqrt[n]{n}}$

(a) diverges by limit comparison test with $\sum_{n=1}^{\infty} \frac{1}{n}$

(b) converges by limit comparison test with $\sum_{n=1}^{\infty} \frac{1}{n}$

(c) converges by limit comparison test with $\sum_{n=1}^{\infty} \frac{1}{\sqrt[n]{n}}$

(d) converges by comparison test with $\sum_{n=1}^{\infty} \frac{1}{\sqrt[n]{n}}$

(e) diverges because $\lim_{n \to \infty} \frac{1}{n \sqrt[n]{n}} = \frac{1}{e}$.

Q2:

The series $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$ is

(a) divergent by the integral test

(b) convergent by the integral test

(c) convergent by the comparaison test

(d) convergent because $\lim_{n \to \infty} \frac{1}{n \ln n} = 0$

(e) convergent by the ratio test

Q3

Consider the series $\sum_{n\geq 2} \dfrac{\cos^2 n}{n^2 + 2n + 1}$

(a) The series diverges

(b) The series converges by alternating series test

(c) The series converges and its sum is zero

(d) The series converges and its sum is less than $\dfrac{1}{2}$

(e) The series converges with sum more than or equal to $\dfrac{1}{2}$

Q4.

The limit of the sequence $\{n\sqrt[n]{e} - n\}_{n=1}^{+\infty}$

(a)   is equal to 1

(b)   is equal to 0

(c)   is equal to e

(d)   does not exist

(e)   is equal to -2