Cal II (S) (Maths 201–NYB)

Answers

1. (a) 1 (b) ∞

2. (a) D (nTT) (b) C (to 1)

3. (a) (LCT) with $\sum \frac{1}{n^2}$ (C pS): $\lim \frac{\sin(1/n^2)}{1/n^2} = 1$ so $\sum$ converges

   (b) (RT): $\lim \dfrac{a_{n+1}}{a_n} = \infty > 1$: $\sum$ diverges

   (c) (CT) with $\sum \frac{1}{n^{3/2}}$ (C pS), or
   ($\int$T): f cont, pos, decr; $\int_2^\infty f\,dx = \frac{1}{2}\ln 2 + \frac{1}{2}$ converges: $\sum$ converges

   (d) ($\sqrt[n]{\ }$T): $\lim \sqrt[n]{a_n} = \lim \frac{25}{n} = 0 < 1$: $\sum$ converges

4. (a) (nTT): $\lim \frac{2^n}{n^2} = \infty \neq 0$: $\sum$ diverges (could use (RT) instead)

   (b) (LCT) with $\sum \frac{1}{n^{5/4}}$ (C pS): $\lim \frac{a_n}{b_n} = \frac{1}{\sqrt[4]{2}} \neq 0, \neq \infty$ so AC.

5. $-6 \leq x < 2$ ($R = 4$) (Use (AST) and (LCT) at endpoints)

6. (a) $a_n \to 0$ (nTT)

   (b) It converges: (LCT) with $\sum a_n$.

7. $\displaystyle\sum_{n=1}^{\infty} (-1)^{n+1} x^n$; converges for $-1 < x < 1$.