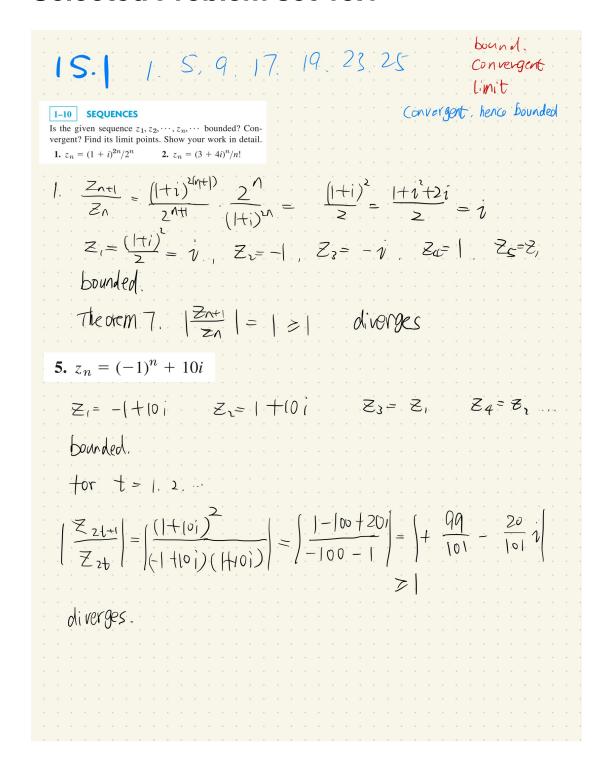
Chapter 15 - Power Series, Taylor Series

Selected Problem set 15.1



9.
$$z_n = (3 + 3i)^{-n}$$

$$|Z| = \frac{1}{6} \left(\left[-i \right] \right) = \frac{\sqrt{2}}{6}$$

$$|Z| = |-\frac{1}{|S|} = \frac{1}{|S|}$$

$$|Z_3| = |-\frac{1}{108}(1+i)| = \frac{\sqrt{2}}{108}$$

$$|Z_{n+1}| = |Z_n| (\frac{1}{3+3i}) = |Z_n| \frac{\sqrt{2}}{6} \le |Z_n| = \frac{\sqrt{2}}{6}$$
 bounded

$$\left|\frac{Z_{n+1}}{Z_{n}}\right| = \left|\frac{(3+3i)^{-(n+1)}}{(3+3i)^{-n}}\right| = \left|(3+3i)^{-1}\right| = \frac{\sqrt{2}}{6} < 1$$
 Converges

16–25 SERIES

Is the given series convergent or divergent? Give a reason. Show details.

16.
$$\sum_{n=0}^{\infty} \frac{(20+30i)^n}{n!}$$
 17.
$$\sum_{n=2}^{\infty} \frac{(-i)^n}{\ln n}$$

$$\left|\frac{Z_{n+1}}{Z_n}\right| = \left|\frac{(-1)^{n+1}}{\ln(n+1)} - \frac{\ln n}{(-1)^n}\right| = \left|-1\right| \cdot \frac{\ln n}{\ln(n+1)} = \frac{\ln n}{\ln(n+1)}$$

$$n^{n+1} > (n+1)^n$$
 for $n \ge 3$ $\Rightarrow \frac{(n n)}{(n (n+1))} > \frac{n}{n+1}$

$$=$$
 $\left|\frac{Z_{n+1}}{Z_n}\right| > \left|\frac{n}{n+1}\right|$ diverges

$$19. \sum_{n=0}^{\infty} \frac{i^n}{n^2 - i}$$

$$\frac{|Z_{n+1}|}{|Z_{n}|} = \frac{|A_{n+1}|}{|A_{n+1}|} = \frac{|A_{n+1}|}{|A_{$$

23.
$$\sum_{n=0}^{\infty} \frac{(-1)^n (1+i)^{2n}}{(2n)!}$$

$$\left|\frac{2n+1}{2n}\right| = \left|\frac{(-1)^{n+1}(1+1)^{2n+2}}{(2n+2)!} \cdot \frac{2n!}{(-1)^{n}(1+1)^{2n}}\right|$$

$$= \left|\frac{-1\cdot(1+1)^{2}}{(2n+2)(2n+1)}\right|$$

$$\left| \frac{2\pi t}{2\pi} \right| = 0 < 1$$
 Converge obsolutely

$$25. \sum_{n=1}^{\infty} \frac{i^n}{n}$$

$$\left|\frac{z_{n+1}}{z_n}\right| = \left|\frac{n+1}{n+1} - \frac{n}{n}\right| = \left|\frac{n}{n+1}\right| = \left|\frac{n}{n+1}\right|$$
 Not sufe

$$|Z_n^{\vec{n}}| = |\overline{\gamma_n}| \Rightarrow |\lim_{n \to \infty} |Z_n|^{\frac{1}{n}} = |$$
 not sure

Per example 3.
$$1-\frac{1}{2}+\frac{1}{3}-\frac{1}{4}$$
 Conditionally Converge.

