

Ans $z = 0 + z(1) + \frac{z^2}{2}(0) +$

$\frac{z^3}{3}(-1) + \frac{z^4}{4}(0) + \frac{z^5}{5}(1) + \dots$

$= z - \frac{z^3}{3} + \frac{z^5}{5} - \dots$ Power

EXERCISE (Problems).

① Expand $\frac{1}{(z+1)(z+2)}$, $|z| < 1$ in

the form of Laurent's Series

Ans $\sum_0^{\infty} (-1)^n z^n \left\{ 1 - \frac{1}{z^{n+1}} \right\}$

② Expand $\frac{1}{z(z^2-3z+2)}$ for the regions

(i) $0 < |z| < 1$

(ii) $1 < |z| < 2$

(iii) $|z| > 2$

Ans! (i) $\frac{1}{2z} + \sum_0^{\infty} z^n - \frac{1}{4} \sum_0^{\infty} \left(\frac{z}{2}\right)^n$

(ii) $\frac{1}{3z} - \frac{1}{2} \sum_0^{\infty} z^n - \frac{1}{4} \sum_0^{\infty} \left(\frac{z}{2}\right)^n$

(iii) $\frac{1}{2z} - \frac{1}{2} \sum_0^{\infty} z^n + \frac{1}{2z} \sum_0^{\infty} \left(\frac{z}{2}\right)^n$

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

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③ Expand $\frac{1}{(z-1)(z-2)}$ for

(i) $0 < |z| < 1$

(ii) $1 < |z| < 2$

(iii) $|z| > 2$

Ans: (i) $\sum_0^{\infty} \left(1 - \frac{1}{2^{n+1}}\right) z^n$

(ii) $-\sum_0^{\infty} z^2 \left(\frac{1}{2^{n+1}} + \frac{1}{z}\right)$

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(iii) $\sum_0^{\infty} (-1+z)^n \frac{1}{2^{n+1}}$

④ Find the expansion of $\frac{1}{(1+z^2)(2+z^2)}$ in powers of z

when (i) $|z| < 1$ (ii) $1 < |z| < \sqrt{2}$

(iii) $|z| > \sqrt{2}$

⑤ Find the Laurent's Expansion of $\frac{1}{(z-1)(z-3)}$ in powers of z

दिपशा

अगस्त 2009

रवि	सोम	मंगल	बुध	गुरु	शुक्र	शनि
30	31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29

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indicating the region in which holds

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Hint: First take in the region

(i) $0 < |z| < 1$ then (ii) $1 < |z| < 3$

(iii) $|z| > 3$

Ans: (i) $\frac{1}{2} \sum_{h=0}^{\infty} \left(1 - \frac{1}{3^{h+1}}\right) z^h$

(ii) $-\frac{1}{2} \sum_{h=0}^{\infty} \left(\frac{1}{2^{h+1}} + \frac{z^h}{3^{h+1}}\right)$

(iii) $\frac{1}{2} \sum_{h=0}^{\infty} (-1 + 3^h) \frac{1}{z^{h+1}}$

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