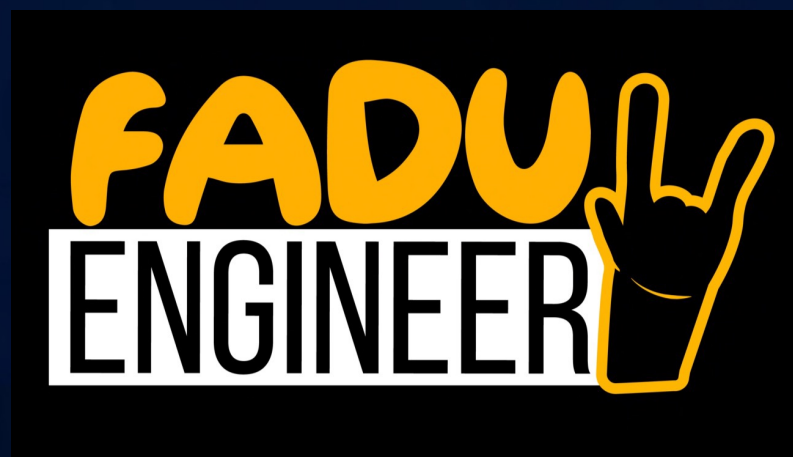


TAYLOR'S & LAURENT'S SERIES

Important Question Bank

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Important Questions

1) Show that Every finite value of z is,
$$e^z = e + e \leq \frac{(z-1)^n}{n!}.$$

2) Expand the function $f(z) = \frac{\sin z}{z - \pi}$ about $z = \pi$

3) Find possible Laurent's Expansion of function
$$f(z) = \frac{2 - z^2}{z(1-z)(2-z)}$$
 about $z = 0$,

indicating the ROC in each case.

4) Find Laurent's Series which represents the function $f(z) = \frac{2}{(z-1)(z-2)}$, when

① $|z| < 1$ ② $1 < |z| < 2$ ③ $|z| > 2$.

5) Expand $f(z) = \frac{1}{z^3 - 3z^2 + 2z}$ as Laurent's

Series about $z = 0$ for, ① $|z| < 1$



② $1 < |z| < 2$

③ $|z| > 2$.

6) Find all possible Laurent's expansions of $f(z) = \frac{z^3 - 6z - 1}{(z-1)(z-3)(z+2)}$, about $z = 3$.

Also indicate region of convergence.

7) obtain Taylor's and Laurent's expansions of $f(z) = \frac{z-1}{z^2-2z-3}$, indicating Roc's.

8) Expand $f(z) = \frac{1}{z^2(z-1)(z+2)}$, about $z=0$

for (i) $|z| < 1$ (ii) $1 < |z| < 2$ (iii) $|z| > 2$.

9) Obtain Taylor's and Laurent's Series for $f(z) = \frac{2z-3}{z^2-4z-3}$ in powers of $(z-4)$ indicating Region of convergence.



10) Find all possible Laurent's Expansion of function, $f(z) = \frac{7z-2}{z(z-2)(z+1)}$ about $z = -1$.

11) Find all possible Laurent's Expansion of $f(z) = \frac{z}{(z-1)(z-2)}$, about $z = -2$.

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12) Obtain the Laurent's Series with valid region of convergence, where

$$f(z) = \frac{(z-2)(z+2)}{(z+1)(z+4)}, \text{ for } \textcircled{i} \ 1 < |z| < 4$$

$$\textcircled{ii} \ |z| > 4.$$

13) Expand $f(z) = \frac{1}{z(z+1)(z-2)}$, \textcircled{i} within the

unit circle about the origin.

\textcircled{ii} within the annulus region between the concentric circles about the origin having radii 1 and 2 respectively.

\textcircled{iii} In the exterior of circle with centre at the origin and radius 2.

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