

1. Determine the sum of the series $\sum_{n=1}^{\infty} n^2 z^n$ for $|z| < 1$. (Hint: start with the series for $1/(1-z)$.)
2. Determine the Taylor series for $f(z) = \sinh(z) \cosh(z)$ about $z = 0$ and state the radius of convergence.
3. Find a Laurent series expansion for $f(z) = \frac{3z-3}{(2z-1)(z-2)}$ on $1/2 < |z-1| < 1$.
4. Find a Laurent series expansion for $f(z) = \frac{e^{(z^2)}}{z^3}$ about $z = 0$.
5. Determine and classify the singularities of $f(z) = z^5 \exp(1/z^2)$.
6. Determine and classify the singularities of $f(z) = z^{-5} \exp(z^2)$.
7. Determine and classify the singularities of $f(z) = \frac{\sin(z)}{z+z^2}$.
8. Determine and classify the singularities of $f(z) = \cos(\pi \sin(1/z))$.