19.2.20.

$$\sin z = \sin\left(z - \pi/2 + \pi/2\right)$$

$$= \cos\left(z - \pi/2\right) = \sum_{k=0}^{\infty} (-1)^k \frac{1}{2k!} \left(z - \frac{\pi}{2}\right)^{2k}$$

$R = \infty$ since $\sin z$ is entire.

22. $$(z-1)e^{-2z} = (z-1)e^{-2(z-1)} \cdot e^{-2}$$

$$= e^{-2}(z-1) \cdot \sum_{n=0}^{\infty} \frac{1}{n!} (-2)^n (z-1)^n$$

$$= \sum_{n=0}^{\infty} \frac{e^{-2}}{n!} (-2)^n (z-1)^{n+1}$$

$R = \infty$ since $(z-1)e^{-2z}$ is entire.

30. $f(z) = 1/z$.

at $z_0 = 1+i$ $\quad f(z) = \frac{1}{1+i} \frac{1}{1 + \frac{z-1-i}{1+i}} = \frac{1}{1+i} \sum_{n=0}^{\infty} (-1)^n \left(\frac{z-1-i}{1+i}\right)^n$

$$= \sum_{n=0}^{\infty} (-1)^n (1+i)^{-n-1} (z-1-i)^n$$

at $z_0 = 3$ $\quad f(z) = \frac{1}{3} \frac{1}{1 + \frac{z-3}{3}} = \frac{1}{3} \sum_{n=0}^{\infty} (-1)^n \left(\frac{z-3}{3}\right)^n$

$$= \sum_{n=0}^{\infty} (-1)^n \, 3^{-n-1} \, (z-3)^n$$