4a. $f(x) = 2x - \frac{8x^3}{3!} + \frac{32x^5}{5!} - \frac{(2x)^7}{7!} + \ldots = \sum_{n=0}^{\infty} \frac{(2x)^{2n-1}(-1)^{n-1}}{(2n-1)!}$

Radius of convergence $= \infty$

b. $f(x) = \ln x + \ln 2 = \ln 2 + (x-1) - \frac{(x-1)^2}{2} + \frac{(x-1)^3}{3} - \frac{(x-1)^4}{4} + \ldots \approx \ln 2 + \sum_{n=1}^{\infty} \frac{(x-1)^n}{n}(-1)^{n-1}$

$RoC = 1$

c. $f(x) = e^2\left(1 + 2(x-1) + \frac{(2(x-1))^2}{2!} + \frac{(2(x-1))^3}{3!} + \ldots\right) = \sum_{n=0}^{\infty} \frac{e^2(2(x-1))^n}{n!}$

$ROC = \infty$

d. $f(x) = 5 - 2x + 3x^2$

$R_oC = \infty$

e. $f(x) = 6 + 4x + 3x^2$

$R_oC = \infty$

f. $f(x) = \frac{1}{6} - \frac{4(x-1)}{6^2} - \frac{4(x-1)^2}{6^3} + \frac{480(x-1)^3}{6^4} - \frac{6916(x-1)^4}{6^5} + \ldots$

$R_oC =$

g. $f(x) = \cosh(-2) + \sinh(-2)(x-1) + \frac{\cosh(-2)(x-1)^2}{2!} + \ldots = \sum_{n=0}^{\infty} \frac{\cosh(-2)(x-1)^{2n}}{(2n)!} + \frac{\sinh(-2)(x-1)^{2n+1}}{(2n+1)!}$

$R_oC = \infty$

h. $f(x) = f(a) + f'(a)(x-a) + \frac{f''(a)(x-a)^2}{2!} + \ldots = \sum_{n=0}^{\infty} \frac{f^{(n)}(a)(x-a)^n}{n!}$

$R_oC = \infty$

i. $f(a) = f(x) + f'(x)(a-x) + \frac{f''(x)(a-x)^2}{2!} + \ldots$

$R_oC = \infty$

3. $f(a+h) = f(a) + f'(a)h + \frac{f''(a)h^2}{2!} + \frac{f'''(a)h^3}{3!} + \cdots$

$R_0C = \infty$