$L = \lim_{n\to\infty}\left(\frac{a_{n+1}}{a}\right)$ $L < 1 \therefore$ converges

$\frac{f^{(n)}(a)}{n!}(x-a)^n$

expand functions

a) $f(x) = \sin(2x)$, $x_0 = 0$

$\sin(0) + \frac{2\cos(0)}{1}(x) - \frac{4\sin(0)}{2}(x^2) - \frac{8\cos(0)}{6}(x^3)$

$= 0 + 2x - \frac{8}{6}x^3$

b) $f(x) = \ln(2x)$, $x_0 = 1$

$\ln(2) + \frac{2}{x}(x-1) - \frac{2}{x^2}\frac{1}{2}(x-1)^2 + \frac{4}{x^3}\frac{1}{6}(x-1)^3$

c) $f(x) = e^{2x}$, $x_0 = 1$

$e^2 + 2e^2(x-1) + 4e^2\frac{1}{2}(x-1)^2 + 8e^2\frac{1}{6}(x-1)^3$

d) $f(x) = 3x^2 - 2x + 5$, $x_0 = 0$

$5 - 2(x) + 3(x^2)$

e) $f(x) = 3x^2 - 2x + 5$ $x_0 = 1$

$6 + 4(x-1) + 3(x-1)^2 = 6 + 4x - 4 + 3x^2 - 6x + 3$

$= 5 - 2x + 3x^2$

f) $f(x) = (3x^2 - 2x + 5)^{-1}$ $x_0 = 1$

?

g) $f(x) = \cosh(x-3)$, $x_0 = 1$

h) $f(x)$ $x_0 = a$

$f(a) + f'(a)(x-a) + f''(a)\frac{1}{2}(x-a)^2 + f'''(a)\frac{1}{6}(x-a)^3 + \ldots$

i) $f(x) + f'(x)(a-x) + f''(x)\frac{1}{2}(a-x)^2 + f'''(x)\frac{1}{6}(a-x)^3 + \ldots$

j) ?