

(43)
$$\frac{1}{1-x^3} = \frac{1}{1-x^3} + \frac{x}{1-x^3} - \frac{2x^2}{1-x^3} + \frac{x^3}{1-x^3} + \frac{x^4}{1-x^3} - \frac{2x^5}{1-x^3} + \frac{x^6}{1-x^3} + \frac{x^7}{1-x^3} \dots$$

$$\frac{1}{1-x^3} + \frac{x}{1-x^3} - \frac{2x^2}{1-x^3} = \underline{\hspace{2cm}}$$

$$\frac{(n+1)! (n+1)!}{2(n+1)!}$$

$$\frac{n! n!}{2n!}$$

$$\frac{\cancel{(n+1)!} \cancel{(n+1)!} \cancel{2n!}}{\cancel{(2n+2)!} \cancel{n!} \cancel{n!}}$$

$$(2n+2)(2n+1)$$

$$= \frac{\cancel{(n+1)!} (n+1)}{\cancel{(2n+2)} (2n+1)} \frac{n+1}{2(2n+1)}$$

$$\rightarrow \frac{1}{4}$$

$$\frac{\tan^{-1} u}{u^2} \rightarrow \frac{\frac{\pi}{2}}{u^2} < \frac{2}{u^2}$$

$$\textcircled{19} \quad \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c} = f'(c)$$

$$f(x) = x^{20} - 3x \quad c = e$$

$$f'(x) = 20x^{19} - 3$$

$$f'(e) = 20e^{19} - 3$$

\textcircled{B}

$$\textcircled{2} \quad \sum \frac{(x-5)^n}{2^n (2n+3)^2} = \frac{(x-5)^n}{2^n (4n^2 + 12n + 9)}$$

$$\rho = \frac{(x-5)}{2} = \left| \frac{x-5}{2} \right| < 1$$

$$|x-5| < 2$$

$$(3, 7)$$

interval of convergence
= 4

radius of convergence
= 2

\textcircled{C}

$$\sqrt[n]{4n^2} \rightarrow 1$$

$$\sqrt[n]{12n} \rightarrow 1$$

$$\sqrt[n]{9} \rightarrow 1$$