

8.3 | 연습문제 정답

2023. 2. 10 업데이트

01. $f(0.02) \approx 0.04$

02. $R_4(x, 1) = \frac{f^{(5)}(c)}{5!}(x-1)^5$

03. $\frac{1.1437}{12}$

04. $-2x - \frac{2}{3}x^3 - \frac{2}{5}x^5 - \dots, \ln\left(\frac{9}{11}\right) = -2\left[\frac{1}{10} - \frac{1}{3}\left(\frac{1}{10}\right)^3 - \frac{1}{5}\left(\frac{1}{10}\right)^5\right]$

05. (a) $\cos x - x \sin x = 1 - \frac{3}{2!}x^2 + \frac{5}{4!}x^4 - \frac{7}{6!}x^6 + \dots = \sum_{n=0}^{\infty} \frac{(-1)^n(2n+1)x^{2n}}{(2n)!}$

(b) $\int_0^1 (\cos x - x \sin x) dx = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n)!}$

06. $f(x) = (1+x)^{\frac{1}{2}} + (1-x)^{\frac{1}{2}} = \sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k} x^k + \sum_{k=0}^{\infty} \binom{\frac{1}{2}}{k} (-x)^k$

$f^{(4)}(0) = -\frac{15}{8}, f^{(51)}(0) = 0$

07. (a) $\frac{1}{3!}$ (b) $-\frac{1}{6!}$ (c) $\frac{1}{2!}$ (d) $\frac{1}{3}$

08. 생략

09. 생략

10.

$$(a) \quad e^x = (1) + (1)x + \left(\frac{1}{2!}\right)x^2 + \cdots + \left(\frac{1}{n!}\right)x^n$$

$$\xleftrightarrow{P_n(x)}$$

$$+ \left\{ \frac{1}{(n+1)!} \right\} x^{n+1} + \left\{ \frac{1}{(n+2)!} \right\} x^{n+2} + \cdots$$

$$\xleftrightarrow{R_n(x)}$$

(b) 생략

$$(c) \quad \ln(1-x) = -x - \frac{1}{2}x^2 - \frac{1}{3}x^3 - \frac{1}{4}x^4 - \cdots$$

$$(d) \quad \frac{1}{(n+1)!}$$

$$11. \quad 1 + \frac{1}{2}x^2 + \frac{(1)(3)}{(2^2)2!}x^4 + \frac{(1)(3)(5)}{(2^3)3!}x^6 + \cdots$$

$$x + \frac{1}{(3)(2)}x^3 + \frac{(1)(3)}{(5)(2^2)2!}x^5 + \frac{(1)(3)(5)}{(7)(2^3)3!}x^7 + \cdots$$

$$12. \quad \frac{1}{1+4x^2} = \sum_{n=0}^{\infty} (-1)^n (2x)^{2n}, \quad -\frac{1}{2} < x < \frac{1}{2}$$

$$13. \quad \sinh x = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1}$$

$$14. \quad f(x) = e^{x \cos \alpha} \cos(x \sin \alpha) = \sum_{n=0}^{\infty} \frac{\cos n\alpha}{n!} x^n$$

$$15. \quad \frac{1}{2}$$