# 工共 212 工業数学 IV
# 第 12 回
# 関数の整級数展開



## 演習 12-1 解答 (1)

$\dfrac{1}{0!}\operatorname{Log} z|_{z=1} = \boxed{0}$,

$(\operatorname{Log} z)' = \boxed{z^{-1}}$, $\dfrac{1}{1!}(\operatorname{Log} z)'\Big|_{z=1} = \boxed{1}$,

$(\operatorname{Log} z)'' = \boxed{-z^{-2}}$, $\dfrac{1}{2!}(\operatorname{Log} z)''|_{z=1} = \boxed{-\dfrac{1}{2}}$,

$(\operatorname{Log} z)''' = \boxed{2z^{-3}}$, $\dfrac{1}{3!}(\operatorname{Log} z)'''|_{z=1} = \boxed{\dfrac{1}{3}}$,



## 演習 12-1 解答 (2)

$\operatorname{Log} z = \boxed{0} + \boxed{1}(z-1) + \boxed{\left(-\dfrac{1}{2}\right)}(z-1)^2 + \boxed{\dfrac{1}{3}}(z-1)^3 + \cdots$, $A = \boxed{1}$,

$\operatorname{Log} z = \boxed{(z-1) - \dfrac{1}{2}(z-1)^2 + \dfrac{1}{3}(z-1)^3 + \cdots}$,

一致 $\boxed{\text{する}}$



## 演習 12-1 解答 (3)

$B = \boxed{0}$, $c_n = \boxed{\dfrac{(-1)^{n-1}}{n}}$,

$$\lim_{n\to\infty}\left|\frac{\boxed{(-1)^{n-1}(n+1)}}{\boxed{(-1)^n n}}\right| = \boxed{1}$$



## 演習 12-2 解答 (1)

(A) $\dfrac{1}{1-z} = \boxed{\displaystyle\sum_{n=0}^{\infty} z^n}$, $f(z) = \boxed{-\displaystyle\sum_{n=0}^{\infty} z^{n-1}}$

$(= -\dfrac{1}{z} - 1 - z - \cdots)$

(B) $\dfrac{1}{1-\frac{1}{z}} = \boxed{\displaystyle\sum_{n=0}^{\infty} z^{-n}}$, $f(z) = \boxed{\displaystyle\sum_{n=0}^{\infty} z^{-n-2}}$



## 演習 12-2 解答 (2)

(C) $\dfrac{1}{1+(z-1)} = \boxed{\displaystyle\sum_{n=0}^{\infty}(-1)^n(z-1)^n}$,

$f(z) = \boxed{\displaystyle\sum_{n=0}^{\infty}(-1)^n(z-1)^{n-1}}$

解答の書き方は以上と若干異なっていてもよい (たとえば $z^{-1}$ を $\frac{1}{z}$ と書くなど)