微分・積分I 2007年前期レポート

(1) $y=\dfrac{1}{e^x+1}$

(2) $y=\sqrt{x^2-2x+2}$

(3) $y=\dfrac{x^4-2x^2+1}{x^5}$

(4) $y=x^2\log x$

(5) $y=2^{\sin x}$

(1)～(5)を微分せよ

Date . . No

微分積分I 前期 レポート課題 解答 2007年

(1) $y' = \dfrac{1' \cdot (e^x+1) - 1 \cdot (e^x+1)'}{(e^x+1)^2} = \dfrac{0 \cdot (e^x+1) - 1 \cdot e^x}{(e^x+1)^2}$

$= \boxed{-\dfrac{e^x}{(e^x+1)^2}}$

(2) $u = x^2-2x+2$ と $y = \sqrt{u}$ の合成関数

$\dfrac{dy}{dx} = \dfrac{dy}{du} \cdot \dfrac{du}{dx} = \left(\dfrac{d}{du} u^{\frac{1}{2}}\right) \cdot \dfrac{d}{dx}(x^2-2x+2)$

$= \dfrac{1}{2} u^{-\frac{1}{2}} \cdot (2x-2) = \dfrac{x-1}{u^{\frac{1}{2}}} = \dfrac{x-1}{\sqrt{u}}$

$= \boxed{\dfrac{x-1}{\sqrt{x^2-2x+2}}}$

(3) $y' = \left(\dfrac{1}{x} - \dfrac{2}{x^3} + \dfrac{1}{x^5}\right)' = (x^{-1} - 2x^{-3} + x$

$= (-1)x^{-2} - 2 \cdot (-3)x^{-4} + (-5)x^{-6}$

$= -\dfrac{1}{x^2} + \dfrac{6}{x^4} - \dfrac{5}{x^6}$

$= \boxed{\dfrac{-x^4+6x^2-5}{x^6}}$

$\left(= \dfrac{-(x^2-1)(x^2-5)}{x^6} = \dfrac{-(x+1)(x-1)(x+\sqrt{5})(x-\right.$

(4) $y' = (x^2)' \log x + x^2 \cdot (\log x)'$

$= 2x \log x + x^2 \cdot \dfrac{1}{x}$

$= 2x \log x + x = \boxed{x(2\log x + 1)}$

(5) $u = \sin x$ と $y = 2^u$ の合成関数

$\dfrac{dy}{dx} = \dfrac{dy}{du}\dfrac{du}{dx} = \left(\dfrac{d}{du} 2^u\right) \cdot \left(\dfrac{d}{dx} \sin x\right) = 2^u (\log 2) \cos$

$= \boxed{(\log 2)(\cos x) 2^{\sin x}}$