

<到達目標> 自分の習得状況を定期的にチェックせよ。

1 置換をせずに、機械的に素早く、合成関数を微分することができる

<もう一段階合成を増やすよ！！>

1 次の関数を微分せよ。

(1) $y = \sin^2 2x$ (2) $y = \cos^2 4x$

(3) $y = \tan^2 3x$ (4) $y = \{\log(2x-1)\}^2$

(5) $y = \sin^2 \frac{x}{2}$ (6) $y = \cos^3 \frac{x}{4}$

(7) $y = \tan^3 \frac{x}{3}$ (8) $y = \{\log(-x+4)\}^2$

(9) $y = \sin^3\left(\frac{x}{3}+1\right)$ (10) $y = \cos^2(x^2+1)$

(11) $y = \tan^2(x^2-x)$ (12) $y = \{\log(\sqrt{x}+1)\}^2$

(13) $y = \log\left(\tan \frac{x}{2}\right)$ (14) $y = \log\{\cos(x^2-4)\}$

(15) $y = e^{\sin^2 x}$ (16) $y = \sin\{\log(x^2+1)\}$

(17) $y = \sqrt{1+\cos^2 x}$

(18) $y = \log(x+\sqrt{x^2+1})$

(19) $y = x\sqrt{x^2+1} + \log(x+\sqrt{x^2+1})$

<「積や商の微分」と「合成関数の微分」の融合。入試では、これらの計算が定番だぞ！>

2 次の関数を微分せよ。

(1) $y = x \log(3x+1)$ (2) $y = x(\log x)^2$

(3) $y = xe^{-2x}$ (4) $y = -x^2e^{-x}$

(5) $y = xe^{-x^2}$

(6) $y = e^{-x}\sin x$

(15) $y = x\log(x + \sqrt{x^2+1})$

(7) $y = \frac{1+e^x}{1+2e^x}$

(7) $y = e^{-x}\cos x$

(8) $y = e^{-x}\sin 2x$

(8) $y = \frac{\sin x + \cos x}{e^x}$

□ 次の関数を微分せよ。

(1) $y = \frac{\sin 4x}{x}$

(2) $y = \frac{e^{-x}}{x}$

(9) $y = e^{2x}\cos 3x$

(10) $y = x^2e^{-x}$

(9) $y = \frac{\sin x - \cos x}{\sin x + \cos x}$

(3) $y = \frac{e^{-x^2}}{x}$

(4) $y = \frac{e^x}{(x-1)^2}$

(11) $y = e^x\log(\cos x)$

(12) $y = 2x\cos^2\frac{x}{2}$

(10) $y = \frac{\sin 2x}{2(3 + \cos 2x)}$

(5) $y = \frac{x}{\sqrt{x^2+1}}$

(6) $y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$

(13) $y = \sin x \cos^2 x$

(14) $y = xe^{\sin x}$

(11) $y = \frac{\sin(\cos x)}{e^{2x+1}}$

解答

①	(1)	$2\sin 4x$	(2)	$-4\sin 8x$	
	(3)	$\frac{6\sin 3x}{\cos^3 3x}$	(4)	$\frac{4\log(2x-1)}{2x-1}$	
	(5)	$\frac{1}{2}\sin x$	(6)	$-\frac{3}{4}\sin\frac{x}{4}\cos^2\frac{x}{4}$	
	(7)	$\frac{\sin^2\frac{x}{3}}{\cos^4\frac{x}{3}}$	(8)	$\frac{2\log(-x+4)}{-x+4}$	
	(9)	$\sin^2\left(\frac{x}{3}+1\right)\cos\left(\frac{x}{3}+1\right)$	(10)	$-4x\sin(x^2+1)\cos(x^2+1)$	
	(11)	$\frac{2(2x-1)\sin(x^2-x)}{\cos^3(x^2-x)}$	(12)	$\frac{\log(\sqrt{x}+1)}{x+\sqrt{x}}$	
	(13)	$\frac{1}{\sin x}$	(14)	$-2x\tan(x^2-4)$	
	(15)	$e^{\sin^2 x}\sin 2x$	(16)	$\cos\{\log(x^2+1)\}\cdot\frac{2x}{x^2+1}$	
	(17)	$-\frac{\sin x\cos x}{\sqrt{1+\cos^2 x}}$	(18)	$\frac{1}{\sqrt{x^2+1}}$	
	(19)	$2\sqrt{x^2+1}$			
	②	(1)	$\log(3x+1)+\frac{3x}{3x+1}$	(2)	$\log x(\log x+2)$
		(3)	$e^{-2x}(1-2x)$	(4)	$xe^{-x}(x-2)$
		(5)	$e^{-x^2}(1-2x^2)$	(6)	$e^{-x}(\cos x-\sin x)$
		(7)	$-e^{-x}(\sin x+\cos x)$	(8)	$-e^{-x}(\sin 2x-2\cos 2x)$
		(9)	$e^{2x}(2\cos 3x-3\sin 3x)$	(10)	$xe^{-x}(2-x)$
		(11)	$e^x\{\log(\cos x)-\tan x\}$	(12)	$2\cos^2\frac{x}{2}-x\sin x$
		(13)	$\cos x(\cos^2 x-2\sin^2 x)$	(14)	$e^{\sin x}(1+x\cos x)$
		(15)	$\log(x+\sqrt{x^2+1})+\frac{x}{\sqrt{x^2+1}}$		
	③	(1)	$\frac{4x\cos 4x-\sin 4x}{x^4}$	(2)	$-\frac{(x+1)e^{-x}}{x^2}$
(3)		$-\frac{(2x^2+1)e^{-x^2}}{x^2}$	(4)	$\frac{e^x(x-3)}{(x-1)^3}$	
(5)		$\frac{1}{(x^2+1)\sqrt{x^2+1}}$	(6)	$\frac{4}{(e^x+e^{-x})^2}$	
(7)		$-\frac{e^x}{(1+2e^x)^2}$	(8)	$-\frac{2\sin x}{e^x}$	
(9)		$\frac{2}{(\sin x+\cos x)^2}$	(10)	$\frac{3\cos 2x+1}{(3+\cos 2x)^2}$	
(11)		$-\frac{\sin x\cos(\cos x)+2\sin(\cos x)}{e^{2x+1}}$			