演習：微分の計算 extra【微分積分】

1.

(1) $y = x^{-\alpha}$

(2) $y = \dfrac{1}{2x}$

(3) $y = \sqrt{3x}$

(4) $y = \dfrac{1}{\sqrt{2x}}$

(5) $y = \sin(2x)$

(6) $y = \cos(3x)$

(7) $y = \tan(2x)$

(8) $y = \dfrac{1}{\tan(3x)}$

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

(10) $y = \ln|2x|$

(11) $y = a^{2x}$

(12) $y = \log_a|3x|$

2.

(1) $y = (2x^2 - 1)^3$

(2) $y = \dfrac{1}{1 - x^2}$

(3) $y = \sqrt{1 - 2x^2}$

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

(5) $y = (1 - 2x^2)^{3/2}$

(6) $y = x(3x^2 + 1)^2$

(7) $y = x^2(1 - x^2)^3$

(8) $y = \dfrac{x}{1 - x^2}$

(9) $y = x\sqrt{1 - 2x^2}$

(10) $y = \dfrac{x}{\sqrt{1 - x^2}}$

(11) $y = \dfrac{\sqrt{2x^2 + 1}}{x + 1}$

(12) $y = \dfrac{1}{(x + 1)\sqrt{x^2 + 1}}$

3.

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

(2) $y = \cos\left(\dfrac{1}{3x}\right)$

(3) $y = \sin\left(\sqrt{2x}\right)$

(4) $y = \cos\big(2\cos(3x)\big)$

(5) $y = \sin^3(2x)$

(6) $y = \dfrac{1}{\sin(3x)}$

(7) $y = \sqrt{\sin(2x)}$

(8) $y = \dfrac{1}{\sqrt{\cos(3x)}}$

(9) $y = x\sin(2x)$

(10) $y = \dfrac{1}{x}\cos\left(\dfrac{1}{3x}\right)$

(11) $y = \sin(2x)\cos(x)$

(12) $y = \sin^2\big(\cos(2x)\big)$

4.

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

(2) $y = e^{1/(x+1)}$

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

(4) $y = e^{\sqrt{2x}}$

(5) $y = (1 - e^{-x})^3$

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

(7) $y = \sqrt{2e^{3x} + 3e^{-2x}}$

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

(9) $y = (x + 1)^2 e^{-2x}$

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

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

(12) $y = xe^{-3x}\cos(2x)$

5.

(1) $y = \ln|1 - x^2|$

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

(3) $y = \ln|\cos(2x)|$

(4) $y = \ln(e^{2x} + e^{-3x})$

(5) $y = \big(\ln|2x + 1|\big)^3$

(6) $y = \dfrac{1}{\ln|x + 2|}$

(7) $y = \sqrt{\ln|2x + 1|}$

(8) $y = \sin\big(2\ln|3x + 1|\big)$

(9) $y = x\ln|2x + 1|$

(10) $y = \dfrac{1}{2x}\ln|x + 1|$

(11) $y = (2x)^x$

(12) $y = x^{\frac{1}{2x}}$

演習：微分の計算 extra【微分積分】解答

1.

(1) $y' = -\alpha x^{-\alpha-1}$

(2) $y' = -\dfrac{1}{2x^2}$

(3) $y' = \dfrac{3}{2\sqrt{3x}}$

(4) $y' = -\dfrac{1}{2x\sqrt{2x}}$

(5) $y' = 2\cos(2x)$

(6) $y' = -3\sin(3x)$

(7) $y' = \dfrac{2}{\cos^2(2x)}$

(8) $y' = -\dfrac{3}{\sin^2(3x)}$

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

(10) $y' = \dfrac{1}{x}$

(11) $y' = 2a^{2x}\ln a$

(12) $y' = \dfrac{1}{x\ln a}$

2.

(1) $y' = 12x(2x^2-1)^2$

(2) $y' = \dfrac{2x}{(1-x^2)^2}$

(3) $y' = -\dfrac{2x}{\sqrt{1-2x^2}}$

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

(5) $y' = -6x(1-2x^2)^{1/2}$

(6) $y' = (15x^2+1)(3x^2+1)$

(7) $y' = 2x(1-4x^2)(1-x^2)^2$

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

(9) $y' = \dfrac{1-4x^2}{\sqrt{1-2x^2}}$

(10) $y' = \dfrac{1}{(1-x^2)\sqrt{1-x^2}}$

(11) $y' = \dfrac{2x-1}{(x+1)^2\sqrt{2x^2+1}}$

(12) $y' = -\dfrac{2x^2+x+1}{(x+1)^2(x^2+1)\sqrt{x^2+1}}$

3.

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

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

(3) $y' = \dfrac{\cos\left(\sqrt{2x}\right)}{\sqrt{2x}}$

(4) $y' = 6\sin(3x)\sin\big(2\cos(3x)\big)$

(5) $y' = 6\sin^2(2x)\cos(2x)$

(6) $y' = -\dfrac{3\cos(3x)}{\sin^2(3x)}$

(7) $y' = \dfrac{\cos(2x)}{\sqrt{\sin(2x)}}$

(8) $y' = \dfrac{3\tan(3x)}{2\sqrt{\cos(3x)}}$

(9) $y' = \sin(2x) + 2x\cos(2x)$

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

(11) $y' = 2\cos(2x)\cos(x) - \sin(2x)\sin(x)$

(12) $y' = -4\sin(2x)\sin\big(\cos(2x)\big)\cos\big(\cos(2x)\big)$

4.

(1) $y' = -xe^{-x^2/2}$

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

(3) $y' = 6e^{2\sin(3x)}\cos(3x)$

(4) $y' = \dfrac{e^{\sqrt{2x}}}{\sqrt{2x}}$

(5) $y' = 3e^{-x}(1-e^{-x})^2$

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

(7) $y' = \dfrac{3(e^{3x}-e^{-2x})}{\sqrt{2e^{3x}+3e^{-2x}}}$

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

(9) $y' = -2x(x+1)e^{-2x}$

(10) $y' = e^{-2x}\big(-2\sin(3x) + 3\cos(3x)\big)$

(11) $y' = -2xe^{-x^2/2}\cos(2e^{-x^2/2})$

(12) $y' = -e^{-3x}\big((3x-1)\cos(2x) + 2x\sin(2x)\big)$

5.

(1) $y' = -\dfrac{2x}{1-x^2}$

(2) $y' = \dfrac{1}{\sqrt{x^2-2}}$

(3) $y' = -\tan(2x)$

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

(5) $y' = \dfrac{6\big(\ln|2x+1|\big)^2}{2x+1}$

(6) $y' = -\dfrac{1}{(x+2)\big(\ln|x+2|\big)^2}$

(7) $y' = \dfrac{1}{(2x+1)\sqrt{\ln|2x+1|}}$

(8) $y' = \dfrac{6\cos\big(2\ln|3x+1|\big)}{3x+1}$

(9) $y' = \ln|2x+1| + \dfrac{2x}{2x+1}$

(10) $y' = -\dfrac{1}{2x^2}\ln|x+1| + \dfrac{1}{2x(2x+1)}$

(11) $y' = (2x)^x\big(\ln(2x)+1\big)$

(12) $y' = -\dfrac{1}{2}x^{\frac{1}{2x}-2}(\ln x - 1)$