高知工科大学

基礎数学ワークブック

(2001年度版)

秋期入学者用

V

解答

< 1対1関係 > (1ページ)

問の解答

(1) 1対1ではない

(2) 1対1ではない

(3) 1対1である

< 逆関数 1 > (2ページ)

問の解答

(1)

$b = f(a) = 1 - 3a$

$3a = 1 - b$

$a = \dfrac{1-b}{3} = f^{-1}(b)$

$f^{-1}(b) = \dfrac{1-b}{3}$

(2)

$b = f(a) = \dfrac{2}{1-a}$

$1 - a = \dfrac{2}{b}$

$a = 1 - \dfrac{2}{b} = f^{-1}(b)$

$f^{-1}(b) = 1 - \dfrac{2}{b}$

(3)

$b = f(a) = \sqrt{a}$

$a = b^2 = f^{-1}(b)$

$f^{-1}(b) = b^2$

< 逆関数 2 > (3ページ)

問の解答

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

(2)
$$y = 1 - \frac{1}{1-x}$$
$$y - 1 = -\frac{1}{1-x}$$
$$x - 1 = \frac{1}{y-1}$$
$$x = \frac{1}{y-1} + 1$$
$$f^{-1}(x) = \frac{1}{x-1} + 1$$

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

< 逆関数 3 > (4ページ)

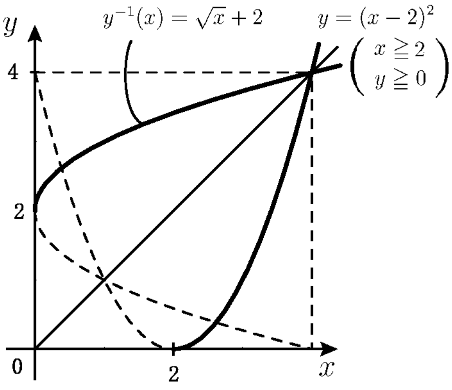
問の解答

$y = (x-2)^2 \quad (x \geqq 2,\ y \geqq 0)$

$\sqrt{y} = x - 2$

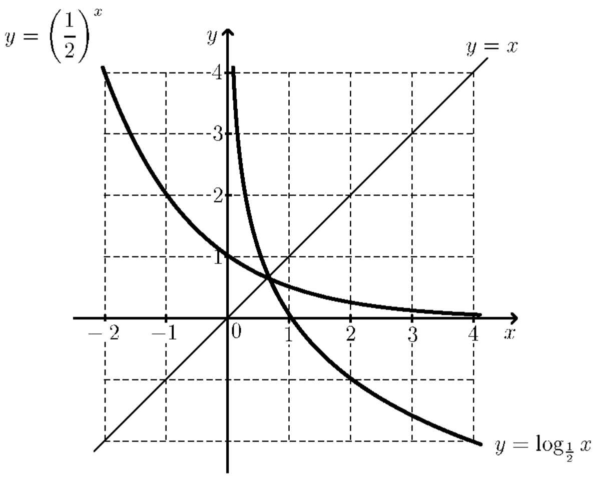
$x = \sqrt{y} + 2$

$f^{-1}(x) = \sqrt{x} + 2 \quad (x \geqq 0,\ y \geqq 2)$



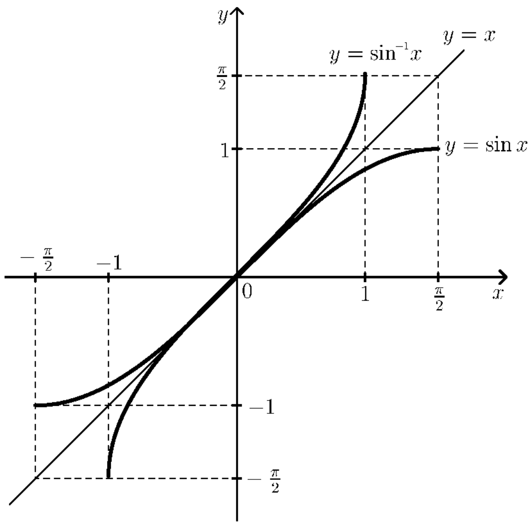
< 逆関数 4 > (5ページ)

問の解答



< 逆三角関数 1 > (6ページ)

問 1 の解答



問 2 の解答

θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin\theta$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1

問 3 の解答

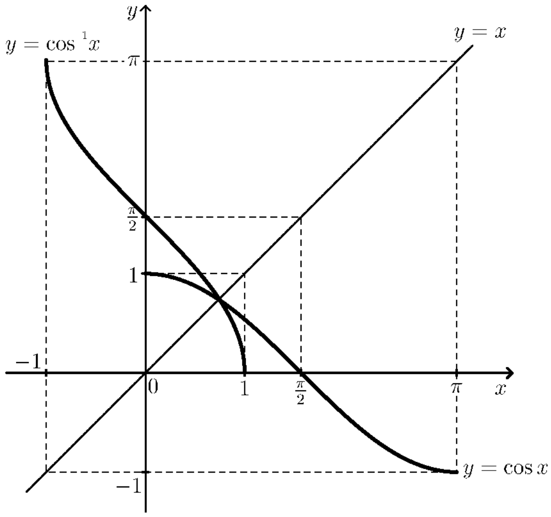
(1) $\frac{\pi}{6}$

(2) $-\frac{\pi}{4}$

(3) $-\frac{\pi}{2}$

$<$ 逆三角関数 2 $>$ (7ページ)

問 1 の解答



問 2 の解答

θ	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π
$\cos\theta$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1

問 3 の解答

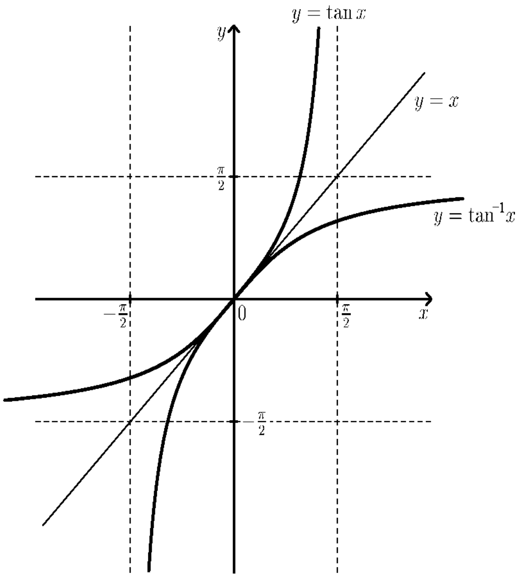
(1) $\frac{\pi}{4}$

(2) $\frac{5\pi}{6}$

(3) $\frac{\pi}{2}$

＜逆三角関数 3 ＞ (8ページ)

問 1 の解答



問 2 の解答

θ	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$
$\tan\theta$	$-\sqrt{3}$	-1	$-\frac{\sqrt{3}}{3}$	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

問 3 の解答

(1) $\dfrac{\pi}{6}$

(2) $-\dfrac{\pi}{3}$

(3) $-\dfrac{\pi}{4}$

< 逆関数の微分 > (9ページ)

問の解答

(1) $y = \cos^{-1} x \quad \Leftrightarrow \quad x = \cos y$

$$\frac{dy}{dx} = \frac{1}{\frac{dx}{dy}} = \frac{1}{(\cos y)'} = \frac{1}{-\sin y} = -\frac{1}{\sqrt{1-\cos^2 y}} = -\frac{1}{\sqrt{1-x^2}}$$

(2) $y = \tan^{-1} x \quad \Leftrightarrow \quad x = \tan y$

$$\frac{dy}{dx} = \frac{1}{\frac{dx}{dy}} = \frac{1}{(\tan y)'} = \frac{1}{\frac{1}{\cos^2 y}} = \frac{1}{1+\tan^2 y} = \frac{1}{1+x^2}$$

< 逆三角関数の積分 > (10ページ)

問 1 の解答

$x = au$ とおくと $dx = adu$ より

$$\int \frac{1}{\sqrt{a^2 - x^2}} dx = \int \frac{1}{\sqrt{a^2 - a^2u^2}} adu = \int \frac{1}{\sqrt{1 - u^2}} du = \sin^{-1}(u) + C = \sin^{-1}\left(\frac{x}{a}\right) + C$$

問 2 の解答

$x = au$ とおくと $dx = adu$ より

$$\int \frac{1}{a^2 + x^2} dx = \int \frac{1}{a^2 + a^2u^2} adu = \frac{1}{a} \int \frac{1}{1 + u^2} du = \frac{1}{a} \tan^{-1}(u) + C = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right) + C$$

< 不定積分の特例 1 > (11ページ)

問の解答

(1) $$\int \sin^2 x dx = \int \frac{1-\cos(2x)}{2} dx = \frac{1}{2}x - \frac{1}{4}\sin(2x) + C$$

(2) $$\int \cos(5x)\cos(2x) dx = \frac{1}{2}\int \{\cos(7x) + \cos(3x)\} dx = \frac{1}{14}\sin(7x) + \frac{1}{6}\sin(3x) + C$$

(3) $$\int \cos(-x)\sin\left(\frac{x}{2}\right) dx = \int \left\{\sin\left(-\frac{x}{2}\right) + \sin\left(\frac{3}{2}x\right)\right\} dx$$

$$= \frac{1}{2}\int \left\{\sin\left(\frac{3}{2}x\right) - \sin\left(\frac{x}{2}\right)\right\} dx = \cos\left(\frac{x}{2}\right) - \frac{1}{3}\cos\left(\frac{3}{2}x\right) + C$$

< 不定積分の特例 2 > (12ページ)

問の解答

$x = au$ とおくと $dx = adu$

$$\int \sqrt{a^2 - x^2}dx = \int \sqrt{a^2 - a^2u^2}adu = a^2 \int \sqrt{1 - u^2}du$$

$$= a^2 \left(\frac{1}{2} \sin^{-1}(u) + \frac{1}{2} u\sqrt{1 - u^2} \right) + C$$

$$= \frac{a^2}{2} \sin^{-1}\left(\frac{x}{a}\right) + \frac{ax}{2}\sqrt{1 - \left(\frac{x}{a}\right)^2} + C$$

$$= \frac{a^2}{2} \sin^{-1}\left(\frac{x}{a}\right) + \frac{x}{2}\sqrt{a^2 - x^2} + C$$

＜円の面積＞(13ページ)

問の解答

(1) $\displaystyle\int_0^a \sqrt{a^2-x^2}dx = \left[\frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right)+\frac{x}{2}\sqrt{a^2-x^2}\right]_0^a = \frac{a^2}{2}\sin^{-1}(1)$

(2) $\displaystyle S = 4\int_0^a \sqrt{a^2-x^2}dx = 4\times\frac{a^2}{2}\times\sin^{-1}(1) = 4\times\frac{a^2}{2}\times\frac{\pi}{2} = \pi a^2$

< 高階導関数 > (14ページ)

問 1 の解答

(1) $f'(x) = 9x^2 - 4x + 1$

$f''(x) = 18x - 4$

(2) $f'(x) = \dfrac{1}{2}\cos\left(\dfrac{x}{2}\right)$

$f''(x) = -\dfrac{1}{4}\sin\left(\dfrac{x}{2}\right)$

(3) $f'(x) = 2e^{2x}$

$f''(x) = 4e^{2x}$

問 2 の解答

(1) $f'(x) = 4x^3 - 10x$

$f''(x) = 12x^2 - 10$

$f'''(x) = 24x$

(2) $f'(x) = -\sin x$

$f''(x) = -\cos x$

$f'''(x) = \sin x$

(3) $f'(x) = -e^{1-x}$

$f''(x) = e^{1-x}$

$f'''(x) = -e^{1-x}$

(4) $f'(x) = 3x^2\log x + x^2$

$f''(x) = 6x\log x + 3x + 2x = 6x\log x + 5x$

$f'''(x) = 6\log x + 6 + 5 = 6\log x + 11$

< グラフの凹凸 1 > (15ページ)

問 1 の解答

(1) $y'' = 6x - 18 = 6(x-3)$

$\left(y' = 3x^2 - 18x + 20\right)$

x	$\cdots$	3	$\cdots$
y''	−	0	+
y	凸	6	凹

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

$\left(y' = 4x^3 - 12x\right)$

x	$\cdots$	−1	$\cdots$	1	$\cdots$
y''	+	0	−	0	+
y	凹	10	凸	10	凹

< グラフの凹凸 2 > (16ページ)

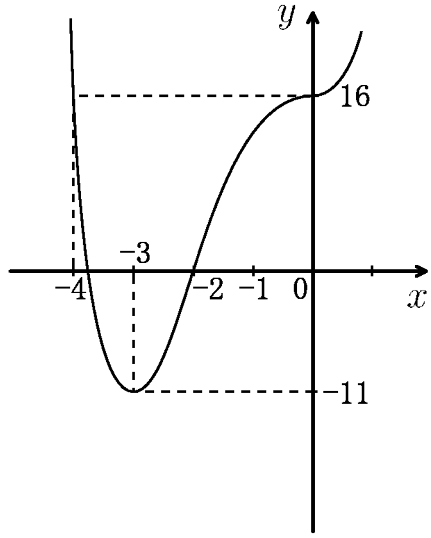
問の解答

$$y'(x) = 4x^3 + 12x^2 = 4x^2(x+3)$$

$$y''(x) = 12x^2 + 24x = 12x(x+2)$$

x	$\cdots$	−3	$\cdots$	−2	$\cdots$	0	$\cdots$
y'	−	0	+	+	+	0	+
y''	+	+	+	0	−	0	+
y	↘	−11	↗	0	↗	16	↗

$y = x^4 + 4x^3 + 16$



< 関数の一次近似 > (17 ページ)

問の解答

$f(x) = \sqrt{x}$ とおくと

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

より、一次近似式は

$x \fallingdotseq a$ のとき、$\sqrt{x} \fallingdotseq \sqrt{a} + \dfrac{1}{2\sqrt{a}}(x-a)$

となる。ここで $a = 1,\ x = 1.1$ とおけば

$$\sqrt{1.1} \fallingdotseq \sqrt{1} + \frac{1}{2\sqrt{1}}(1.1-1) = 1 + \frac{1}{2} \times 0.1 = 1 + \frac{1}{20} = \frac{21}{20}$$

$<$ ロピタルの定理 1 $>$ (18ページ)

問の解答

(1) $\displaystyle\lim_{x\to3}\frac{4x^3}{27}=4$

(2) $\displaystyle\lim_{x\to5}\frac{\frac{1}{x-4}}{1}=1$

(3) $\displaystyle\lim_{x\to2}\frac{3x^2-12}{2(x-2)}=\lim_{x\to2}\frac{6x}{2}=6$

(4) $\displaystyle\lim_{x\to a}\frac{4x^3-4a^3-12a^2(x-a)}{3(x-a)^2}=\lim_{x\to a}\frac{12x^2-12a^2}{6(x-a)}=\lim_{x\to a}\frac{24x}{6}=4a$

< ロピタルの定理 2 > (19ページ)

問の解答

(1) $\displaystyle \lim_{x\to a}\frac{f'(x)-f'(a)-f''(a)(x-a)}{3(x-a)^2}=\lim_{x\to a}\frac{f''(x)-f''(a)}{6(x-a)}$

$\displaystyle =\lim_{x\to a}\frac{f'''(x)}{6}=\frac{1}{6}f'''(a)$

(2) $\displaystyle \lim_{x\to a}\frac{f'(x)-f'(a)-f''(a)(x-a)-\frac{1}{2}f'''(a)(x-a)^2}{4(x-a)^3}$

$\displaystyle =\lim_{x\to a}\frac{f''(x)-f''(a)-f'''(a)(x-a)}{12(x-a)^2}=\lim_{x\to a}\frac{f'''(x)-f'''(a)}{24(x-a)}$

$\displaystyle =\lim_{x\to a}\frac{f''''(x)}{24}=\frac{1}{24}f''''(a)$

< 関数の高次近似 > (20 ページ)

問の解答

$x \fallingdotseq a$ のとき

$$f(x) \fallingdotseq f(a) + f'(a)(x-a) + \frac{1}{2}f''(a)(x-a)^2 + \frac{1}{6}f'''(a)(x-a)^3 + \frac{1}{24}f''''(a)(x-a)^4$$

< 高階微分係数 > (21 ページ)

問の解答

(1) $f^{(4)}(x) = 2^4 e^{2x}$, $f^{(4)}(0) = 2^4 e^0 = 2^4 = 16$

(2) $f^{(n)}(x) = 2^n e^{2x}$, $f^{(n)}(0) = 2^n e^0 = 2^n$

(3) $f^{(1)}(x) = -\sin x$, $f^{(1)}(0) = 0$

$f^{(2)}(x) = -\cos x$, $f^{(2)}(0) = -1$

$f^{(3)}(x) = \sin x$, $f^{(3)}(0) = 0$

$f^{(4)}(x) = \cos x$, $f^{(4)}(0) = 1$

$f^{(5)}(x) = -\sin x$, $f^{(5)}(0) = 0$

$f^{(6)}(x) = -\cos x$, $f^{(6)}(0) = -1$

$f^{(7)}(x) = \sin x$, $f^{(7)}(0) = 0$

$f^{(8)}(x) = \cos x$, $f^{(8)}(0) = 1$

< 関数の n 次近似 > (22ページ)

問の解答

$f^{(n)}(x) = e^x$ より $f^{(n)}(a) = e^a$

$x \fallingdotseq a$ のとき

$$e^x \fallingdotseq e^a + e^a(x-a) + \frac{e^a}{2!}(x-a)^2 + \cdots + \frac{e^a}{n!}(x-a)^n$$

< テーラー展開 > (23ページ)

問の解答

(1) $e^x = e^3 + e^3(x-3) + \frac{1}{2!}e^3(x-a)^2 + \frac{1}{3!}(x-3)^3 + \cdots + \frac{1}{n!}e^3(x-3)^n + \cdots$

(2) $e^x = 1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \cdots + \frac{1}{n!}x^n + \cdots$

< マクローリン展開 > (24 ページ)

問の解答

$f(0) = \cos 0 = 1$

$\cos x = 1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4 - \frac{1}{6!}x^6 + \frac{1}{8!}x^8 - \frac{1}{10}x^{10} + \cdots$

＜近似の練習 1＞(25ページ)

問 1 の解答

(1) $\sqrt{x} \fallingdotseq \sqrt{a} + \dfrac{1}{2\sqrt{a}}(x-a)$

$$\sqrt{9.1} \fallingdotseq \sqrt{9} + \frac{1}{2\sqrt{9}}(9.1-9) = 3 + \frac{1}{6}(0.1) = \frac{181}{60}$$

(2) $\log x \fallingdotseq \log a + \dfrac{1}{a}(x-a)$

$$\log 1.1 \fallingdotseq \log 1 + \frac{1}{1}(1.1-1) = 0 + 0.1 = 0.1$$

問 2 の解答

(1) $\sqrt{x} \fallingdotseq \sqrt{a} + \dfrac{1}{2\sqrt{a}}(x-a) - \dfrac{1}{8a\sqrt{a}}(x-a)^2$

(2) $\log x \fallingdotseq \log a + \dfrac{1}{a}(x-a) - \dfrac{1}{2a^2}(x-a)^2$

(3) $\sin x \fallingdotseq \sin a + (\cos a)(x-a) - \dfrac{1}{2}(\sin a)(x-a)^2$

< 近似の練習 2 > (26ページ)

問 1 の解答

$$e \fallingdotseq 1 + 1 + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} = \frac{326}{120} \fallingdotseq 2.7167$$

問 2 の解答

$$\sin 1 \fallingdotseq 1 - \frac{1}{6} = \frac{5}{6} \fallingdotseq 0.8333$$

$<$ 2変数関数 $>$ (27ページ)

問の解答

(1) $16 + 24 + 27 = 67$

(2) $\dfrac{\frac{1}{2}+2}{\frac{3}{2}-1} = \dfrac{\frac{5}{2}}{\frac{1}{2}} = 5$

(3) $\sin\dfrac{\pi}{2}\log e = 1$

(4) $2^{-3} = \dfrac{1}{8}$

< 偏導関数 1 > (28ページ)

問の解答

(1) $f(x,0) = x + 1$, $f_x(x,0) = 1$

$f(x,1) = 2x$, $f_x(x,1) = 2$

$f(x,2) = 3x - 1$, $f_x(x,2) = 3$

$f(x,b) = (1 + b)x - b + 1$, $f_x(x,b) = 1 + b$

(2) $f(x,0) = x^3$, $f_x(x,0) = 3x^2$

$f(x,1) = x^3 - 2x^2 + x - 3$, $f_x(x,1) = 3x^2 - 4x + 1$

$f(x,2) = x^3 - 4x^2 + 8x - 48$, $f_x(x,2) = 3x^2 - 8x + 8$

$f(x,b) = x^3 - 2bx^2 + b^3x - 3b^4$, $f_x(x,b) = 3x^2 - 4bx + b^3$

< 偏導関数 2 > (29 ページ)

問の解答

(1) $f(x,b) = x^2 - 2x + 3bx + 4b^2 - 5b - 6$

$f_x(x,b) = 2x - 2 + 3b$

$f_x(x,y) = 2x - 2 + 3y$

(2) $f(x,b) = 7x^5 - 6bx^4 + 5b^3x^3 + 4b^5x - 3b^7$

$f_x(x,b) = 35x^4 - 24bx^3 + 15b^3x^2 + 4b^5$

$f_x(x,y) = 35x^4 - 24x^3y + 15x^2y^3 + 4y^5$

< 偏導関数 3 > (30ページ)

問の解答

(1) $f(0,y) = -y+1$, $f_y(0,y) = -1$

$f(1,y) = 2$, $f_y(1,y) = 0$

$f(2,y) = y+3$, $f_y(2,y) = 1$

$f(a,y) = (a-1)y+a+1$, $f_y(a,y) = a-1$

(2) $f(0,y) = -3y^4$, $f_y(0,y) = -12y^3$

$f(1,y) = -3y^4+y^3-2y+1$, $f_y(1,y) = -12y^3+3y^2-2$

$f(2,y) = -3y^4+2y^3-8y+8$, $f_y(2,y) = -12y^3+6y^2-8$

$f(a,y) = -3y^4+ay^3-2a^2y+a^3$, $f_y(a,y) = -12y^3+3ay^2-2a^2$

< 偏導関数 4 > (31 ページ)

問の解答

(1) $f(a, y) = a^2 - 2a + 3ay + 4y^2 - 5y - 6$

$f_y(a, y) = 3a + 8y - 5$

$f_y(x, y) = 3x + 8y - 5$

(2) $f(a, y) = 7a^5 - 6a^4y + 5a^3y^3 + 4ay^5 - 3y^7$

$f_y(a, y) = -6a^4 + 15a^3y^2 + 20ay^4 - 21y^6$

$f_y(x, y) = -6x^4 + 15x^3y^2 + 20xy^4 - 21y^6$

< 偏微分 1 > (32ページ)

問の解答

(1) $6x - 1 + 2y$

(2) $5x^4 + 20x^3y - 3x^2y^2 - 4xy^3 + 6y^4$

(3) $2e^{2x} + \sin x \sin(2y) + 3\log y - \dfrac{2x}{y}$

＜ 偏微分 2 ＞ (33 ページ)

問の解答

(1) $2x + 10y - 6$

(2) $5x^4 - 2x^3y - 6x^2y^2 + 24xy^3 + 42y^5$

(3) $-2\cos x \cos(2y) + \dfrac{3x}{y} + \dfrac{x^2}{y^2}$

< 偏微分 3 > (34 ページ)

問の解答

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

, $\dfrac{\partial}{\partial y}(x^3 - x^2y^2 + 3xy^5)$
$= -2x^2y + 15xy^4$

(2) $\dfrac{\partial}{\partial x}\left(\dfrac{x-1}{2y}\right) = \dfrac{1}{2y}$, $\dfrac{\partial}{\partial y}\left(\dfrac{x-1}{2y}\right) = -\dfrac{x-1}{2y^2}$

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

$\left(= -2y^{-2x}\log y\right)$

, $\dfrac{\partial}{\partial y}\left(\left(\dfrac{1}{y}\right)^{2x}\right) = 2x\left(\dfrac{1}{y}\right)^{2x-1} \times \left(-\dfrac{1}{y^2}\right)$

$\left(= -2xy^{-2x-1}\right)$

$<$ 偏微分 4 $>$ (35 ページ)

問の解答

(1) $\dfrac{\partial z}{\partial x} = 10(2x+y^2)^4$, $\dfrac{\partial z}{\partial y} = 10y(2x+y^2)^4$

(2) $\dfrac{\partial z}{\partial x} = -\dfrac{1}{\sqrt{1-2x+3y^2}}$, $\dfrac{\partial z}{\partial y} = \dfrac{3y}{\sqrt{1-2x+3y^2}}$

(3) $\dfrac{\partial z}{\partial x} = 3e^{3x-y^2}$, $\dfrac{\partial z}{\partial y} = -2ye^{3x-y^2}$

(4) $\dfrac{\partial z}{\partial x} = -\dfrac{\cos x\cos(2y)}{1-\sin x\cos(2y)}$, $\dfrac{\partial z}{\partial y} = \dfrac{2\sin x\sin(2y)}{1-\sin x\cos(2y)}$

< 偏微分 5 > (36 ページ)

問の解答

(1) $f_x(x,y) = 5x^4 - 4x^3y + 4xy^3$, $f_y(x,y) = -x^4 + 6x^2y^2 - 28y^3$

(2) $f_x(x,y) = -5\sin(5x - y^2)$, $f_y(x,y) = 2y\sin(5x - y^2)$

(3) $\dfrac{\partial z}{\partial x} = -\dfrac{y}{(xy-2y^3)^2}$, $\dfrac{\partial z}{\partial y} = -\dfrac{x-6y^2}{(xy-2y^3)^2}$

(4) $z_x = -\dfrac{y}{(2xy-y^2)\sqrt{2xy-y^2}}$, $z_y = -\dfrac{x-y}{(2xy-y^2)\sqrt{2xy-y^2}}$

(5) $z_x = -y^2 e^{3y-xy^2+y^3}$, $z_y = (3 - 2xy + 3y^2)e^{3y-xy^2+y^3}$

< 2階偏導関数 1 > (37ページ)

問の解答

(1) $f_{xx}(x,y) = 20x^3 - 24x^2y + 6y^2$, $f_{yy}(x,y) = 6x^2 + 48y^2$

(2) $\dfrac{\partial^2 z}{\partial y^2} = -4\cos(2x)\sin(y^2)$, $\dfrac{\partial^2 z}{\partial y^2} = 2\cos(2x)\cos(y^2) - 4y^2\cos(2x)\sin(y^2)$

＜ 2階偏導関数 2 ＞ (38ページ)

問の解答

(1) $f_{xy}(x,y) = -8x^3 + 12xy$, $f_{yx}(x,y) = -8x^3 + 12xy$

(2) $\dfrac{\partial^2 z}{\partial y \partial x} = -4y\sin(2x)\cos(y^2)$, $\dfrac{\partial^2 z}{\partial x \partial y} = -4y\sin(2x)\cos(y^2)$

< 偏微分係数 > (39 ページ)

問の解答

(1) $f_x(x,y) = 3x^2 - 4xy + 5y^2$, $f_y(x,y) = -2x^2 + 10xy - 12y^3$

$f_x(2,1) = 12 - 8 + 5 = 9$, $f_y(2,1) = -8 + 20 - 12 = 0$

(2) $f_x(x,y) = -\sin x \sin(2y)$, $f_y(x,y) = 2\cos x \cos(2y)$

$f_x\left(\frac{\pi}{3}, \frac{\pi}{4}\right) = -\frac{\sqrt{3}}{2}$, $f_y\left(\frac{\pi}{3}, \frac{\pi}{4}\right) = 0$

(3) $f_x(x,y) = 2\log(y^3)$, $f_y(x,y) = \frac{2x \times 3y^2}{y^3} = \frac{6x}{y}$

$f_x(1,1) = 0$, $f_y(1,1) = 6$

＜ 2 変数関数のグラフ ＞ (40 ページ)

問 1 の解答

(1) x 軸方向の傾き $= 2$

y 軸方向の傾き $= -1$

z 切片 $= 3$

(2) x 軸方向の傾き $= m$

y 軸方向の傾き $= n$

z 切片 $= k$

問 2 の解答

(1) $y = 1$

$z = 3$

(2) $y = 2$

$z = x$

(3) $x = 2$

$z = 2 + 2y - y^2$