1 経済数学入門 II (自習用問題・略解)

問題 1.1

(1) $\dfrac{1}{x^3}$　(2) $\dfrac{1}{x^{0.4}}$　(3) $\dfrac{1}{x^{\frac{1}{2}}}$　(4) $\dfrac{1}{x^{\frac{2}{3}}}$

(5) $\dfrac{x^2}{y^3}$　(6) $\dfrac{2y^4}{x^3}$　(7) $\dfrac{0.6x^{0.4}}{y^{0.4}}$　(8) $\dfrac{y^{\frac{2}{3}}}{3x^{\frac{2}{3}}}$

(9) x^3　(10) $x^{0.4}$　(11) x^3　(12) $\dfrac{x^{0.4}}{y^{0.4}}$

問題 1.2

(1) $\dfrac{1}{x^3}$　(2) $\dfrac{1}{x^{0.4}}$　(3) $\dfrac{1}{x^{\frac{2}{3}}}$

(4) $\dfrac{1}{x}$　(5) $x^{1.6}$　(6) $\dfrac{1}{x^{\frac{1}{3}}}$

(7) x^3　(8) $\dfrac{1}{x^{\frac{2}{3}}}$　(9) $\dfrac{1}{x^{\frac{1}{2}}}$

(10) $\dfrac{y}{x^3}$　(11) $\dfrac{x^3}{y^5}$　(12) $\dfrac{y}{x}$

問題 1.3

(1) $3x^2$　(2) $6x^5$　(3) $2018x^{2017}$

(4) $-\dfrac{1}{x^2}$　(5) $-\dfrac{2}{x^3}$　(6) $-\dfrac{2018}{x^{2019}}$

(7) $1.4x^{0.4}$　(8) $\dfrac{0.4}{x^{0.6}}$　(9) $-\dfrac{0.4}{x^{1.4}}$

(10) $\dfrac{5x^{\frac{2}{3}}}{3}$　(11) $\dfrac{2}{3x^{\frac{1}{3}}}$　(12) $-\dfrac{1}{3x^{\frac{4}{3}}}$

2 経済数学入門 II (自習用問題・略解)

問題 2.1

(1) $6x^2$ (2) $-6x$ (3) 0.4 (4) 0

(5) $-\dfrac{2}{x^2}$ (6) $-\dfrac{6}{x^3}$ (7) $-\dfrac{1.2}{x^{0.7}}$ (8) $\dfrac{2}{x^{1.4}}$

(9) $3x^{\frac{1}{2}}$ (10) $\dfrac{3}{2x^{\frac{1}{2}}}$ (11) $\dfrac{2}{x^{\frac{3}{2}}}$ (12) $-\dfrac{5}{8x^{\frac{1}{6}}}$

問題 2.2

(1) $2x$ (2) -1 (3) -0.2

(4) $4x - 3$ (5) $6x - 4$ (6) x

(7) $6x^2 - 6x$ (8) $8x^3 - 9x^2 + 4$ (9) $10x^4 - 12x^3 + 8x$

問題 2.3

(1) $6x - 2$ (2) $16x^2 + 2$

(3) $9x^2 + 8x - 6$ (4) $32x^3 + 4x$

(5) $4x - 5$ (6) $6x^2 - 10x$

(7) $6x^2 - 5$ (8) $10x^4 - 10x$

(9) $3x^2 + 2x - 1$ (10) $6x^2 + 2x - 3$

問題 2.4

(1) $8(2x + 3)^3$ (2) $15(3x - 4)^4$ (3) $6(x - 5)^5$

(4) $8x(x^2 + 3)^3$ (5) $15x^2(x^3 - 4)^4$ (6) $72x^3(3x^4 - 5)^5$

(7) $5(x^2 + 3x + 4)^4(2x + 3)$ (8) $6(x^3 - 4x + 5)^5(3x^2 - 4)$

(9) $12(2x^3 + 4x - 5)^5(3x^2 + 2)$ (10) $15x(x^3 - 3x^2 - 4)^4(x - 2)$

問題 **2.5**

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

(2) $-\dfrac{6}{(3x-4)^3}$

(3) $\dfrac{8}{(-2x+3)^5}$

(4) $\dfrac{0.8}{(2x+3)^{0.6}}$

(5) $-\dfrac{1.8}{(3x-4)^{1.6}}$

(6) $\dfrac{0.8x}{(x^2-3)^{0.6}}$

(7) $\dfrac{10(2x+3)^{\frac{2}{3}}}{3}$

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

(9) $-\dfrac{2x^2}{(2x^3-4)^{\frac{4}{3}}}$

(10) $-\dfrac{5(2x-3)}{(x^2-3x+4)^6}$

(11) $\dfrac{0.4(2x-3)}{(x^2-3x+4)^{0.6}}$

(12) $\dfrac{2(2x-3)}{3(x^2-3x+4)^{\frac{1}{3}}}$

3 経済数学入門 II (自習用問題・略解)

問題 3.1

(1) $(2x-5)(6x-5)$

(2) $x^2(2x-5)^3(14x-5)$

(3) $2x(3x-5)$

(4) $2x(2x-5)(4x-5)$

(5) $4x^3(2x-5)(3x-5)$

(6) $4x^3(2x-5)^3(4x-5)$

(7) $5(2x-5)^3(2x-1)$

(8) $20x^3(2x-5)^5(x-1)$

問題 3.2

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

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

(3) $-\dfrac{6}{x^4}$

(4) $-\dfrac{1}{(x+2)^2}$

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

(6) $-\dfrac{6}{(3x-4)^2}$

(7) $-\dfrac{4}{(2x-5)^3}$

(8) $-\dfrac{8}{(2x-5)^5}$

(9) $-\dfrac{5(2x-3)}{(x^2-3x+4)^6}$

問題 3.3

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

(2) $\dfrac{3}{x^2}$

(3) $\dfrac{4}{x^2}$

(4) $1-\dfrac{1}{x^2}\ \left(=\dfrac{x^2-1}{x^2}\right)$

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

(6) $2+\dfrac{4}{x^2}\ \left(=\dfrac{2x^2+4}{x^2}\right)$

(7) $2x+1-\dfrac{1}{x^2}\ \left(=\dfrac{2x^3+x^2-1}{x^2}\right)$

*(8) $1-\dfrac{1}{x^2}-\dfrac{2}{x^3}\ \left(=\dfrac{x^3-x-2}{x^3}\right)$

発展問題 3.4

(1) $\dfrac{2x-1}{x^{0.8}(2x-5)^{0.2}}$

(2) $\dfrac{2x-3}{x^{0.4}(2x-5)^{0.6}}$

(3) $\dfrac{2(x-2)}{x^{0.2}(2x-5)^{0.8}}$

(4) $\dfrac{0.5(4x-5)}{x^{0.5}(2x-5)^{0.5}}$

(5) $\dfrac{2(x-1)}{x^{\frac{3}{5}}(2x-5)^{\frac{2}{5}}}$

(6) $\dfrac{6x-5}{3x^{\frac{2}{3}}(2x-5)^{\frac{1}{3}}}$

発展問題 3.5

(1) $x = \dfrac{5}{2}, \dfrac{5}{6}$

(2) $x = 0, \dfrac{5}{2}, \dfrac{5}{14}$

(3) $x = 0, \dfrac{5}{2}, \dfrac{5}{4}$

(4) $x = 0, \dfrac{5}{2}, \dfrac{5}{4}$

(5) $x = \dfrac{5}{2}, \dfrac{1}{2}$

(6) $x = 0, \dfrac{5}{2}, 1$

(7) $x = 1, -1$

(8) $x = 2, -2$

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

(10) $x = \dfrac{5}{6}$

発展問題 3.6

(1) $AC(x) = \boldsymbol{x + 3 + \dfrac{4}{x}}$

(2) $x = \boldsymbol{2}$

4　経済数学入門 II (自習用問題・略解)

問題 4.1

(1) $f(1, -2) = 5$, $f(3, 4) = -5$ 　　　　(2) $f(1, -2) = -6$, $f(3, 4) = 12$

(3) $f(1, -2) = -2$, $f(3, 4) = 36$ 　　　(4) $f(1, -2) = 2$, $f(3, 4) = 1$

(5) $f(1, -2) = -9$, $f(3, 4) = 5$ 　　　(6) $f(1, -2) = 0$, $f(3, 4) = 0$

(7) $f(1, -2) = -2$, $f(3, 4) = 4$ 　　　(8) $f(1, -2) = 4$, $f(3, 4) = 2$

問題 4.2

略

5 経済数学入門 II (自習用問題・略解)

問題 5.1

(1) $f_x(x,y) = 2$
    $f_y(x,y) = 0$

(2) $f_x(x,y) = 0$
    $f_y(x,y) = 2y + 3$

(3) $f_x(x,y) = 3$
    $f_y(x,y) = -4$

(4) $f_x(x,y) = 6x$
    $f_y(x,y) = -12y^2$

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

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

問題 5.2

(1) $f_x(x,y) = 3x^2y^2$
    $f_y(x,y) = 2x^3y$

(2) $f_x(x,y) = 6x^2y^4$
    $f_y(x,y) = 8x^3y^3$

(3) $f_x(x,y) = y$
    $f_y(x,y) = x$

(4) $f_x(x,y) = 2y^3$
    $f_y(x,y) = 6xy^2$

(5) $f_x(x,y) = \dfrac{0.4y^{0.6}}{x^{0.6}}$
    $f_y(x,y) = \dfrac{0.6x^{0.4}}{y^{0.4}}$

(6) $f_x(x,y) = \dfrac{0.8y^{0.2}}{x^{0.2}}$
    $f_y(x,y) = \dfrac{0.2x^{0.8}}{y^{0.8}}$

(7) $f_x(x,y) = \dfrac{y^{\frac{2}{3}}}{3x^{\frac{2}{3}}}$
    $f_y(x,y) = \dfrac{2x^{\frac{1}{3}}}{3y^{\frac{2}{3}}}$

*(8) $f_x(x,y) = \dfrac{1}{y}$
    $f_y(x,y) = -\dfrac{x}{y^2}$

問題 5.3

(1) $f_x(x,y) = y + 1$
    $f_y(x,y) = x + 1$

(2) $f_x(x,y) = 2y - 3$
    $f_y(x,y) = 2x + 4$

(3) $f_x(x,y) = 2x - 4y$
    $f_y(x,y) = -4x + 8y$

(4) $f_x(x,y) = 4x - 3y$
    $f_y(x,y) = -3x - 8y$

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

(6) $f_x(x,y) = 2x + 2y$
    $f_y(x,y) = 2x - 6y + 4$

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

(8) $f_x(x, y) = 3x^2 - 12xy + 12y^2$
$f_y(x, y) = -6x^2 + 24xy - 24y^2$

問題 5.4

(1) $f_{xx}(x, y) = 0$
$f_{xy}(x, y) = 1$
$f_{yx}(x, y) = 1$
$f_{yy}(x, y) = 0$

(2) $f_{xx}(x, y) = 0$
$f_{xy}(x, y) = 2$
$f_{yx}(x, y) = 2$
$f_{yy}(x, y) = 0$

(3) $f_{xx}(x, y) = 2$
$f_{xy}(x, y) = -4$
$f_{yx}(x, y) = -4$
$f_{yy}(x, y) = 8$

(4) $f_{xx}(x, y) = 4$
$f_{xy}(x, y) = -3$
$f_{yx}(x, y) = -3$
$f_{yy}(x, y) = -8$

(5) $f_{xx}(x, y) = 6xy^2 + 2y^3$
$f_{xy}(x, y) = 6x^2y + 6xy^2 + 4y^3$
$f_{yx}(x, y) = 6x^2y + 6xy^2 + 4y^3$
$f_{yy}(x, y) = 2x^3 + 6x^2y + 12xy^2$

(6) $f_{xx}(x, y) = 2$
$f_{xy}(x, y) = 2$
$f_{yx}(x, y) = 2$
$f_{yy}(x, y) = -6$

(7) $f_{xx}(x, y) = 12x$
$f_{xy}(x, y) = -6y$
$f_{yx}(x, y) = -6y$
$f_{yy}(x, y) = -6x$

(8) $f_{xx}(x, y) = 6x - 12y$
$f_{xy}(x, y) = -12x + 24y$
$f_{yx}(x, y) = -12x + 24y$
$f_{yy}(x, y) = 24x - 48y$

*(9) $f_{xx}(x, y) = 0$
$f_{xy}(x, y) = -\dfrac{1}{y^2}$
$f_{yx}(x, y) = -\dfrac{1}{y^2}$
$f_{yy}(x, y) = \dfrac{2x}{y^3}$

*(10) $f_{xx}(x, y) = \dfrac{2y}{x^3}$
$f_{xy}(x, y) = -\dfrac{1}{x^2} - \dfrac{1}{y^2}$
$f_{yx}(x, y) = -\dfrac{1}{x^2} - \dfrac{1}{y^2}$
$f_{yy}(x, y) = \dfrac{2x}{y^3}$

6 経済数学入門 II (自習用問題・略解)

問題 6.1

(1) $(x, y) = (-1, -3)$

(2) $(x, y) = (\dfrac{3}{2}, 1)$

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

(4) $(x, y) = (0, \dfrac{1}{2})$

問題 6.2

(1) $(x, y) = (0, 0)$

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

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

(4) $(x, y) = (-1, 0)$

(5) $(x, y) = (-3, 1)$

(6) $(x, y) = (\dfrac{1}{6}, \dfrac{5}{6})$

(7) $(x, y) = (0, 0), (-2, -2)$

(8) $(x, y) = (0, 0), (\dfrac{1}{4}, -\dfrac{1}{6})$

発展問題 6.3

(1) $(x, y) = (0, 1), (0, -1), (2, 1), (2, -1)$

(2) $(x, y) = (0, 0), (1, 0), (-1, 0)$

(3) $(x, y) = (0, 1), (0, -1), (2, 0), (-2, 0)$

(4) $(x, y) = (0, 0), (-2, 1)$

(5) $(x, y) = (0, 0), (-\dfrac{1}{2}, \dfrac{1}{4})$

(6) $(x, y) = (0, 0), (\dfrac{1}{2}, -\dfrac{3}{8}), (1, -1)$

(7) $(x, y) = (0, 0), (1, 1), (1, -1), (-1, 1), (-1, -1)$

(8) $(x, y) = (1, 1), (-1, 1)$

7 経済数学入門 II (自習用問題・略解)

問題 7.1

(1) $(x^*, y^*) = (\mathbf{2}, \mathbf{1}),\quad \pi(x^*, y^*) = \mathbf{10}$

(2) $(x^*, y^*) = (\mathbf{3}, \mathbf{3}),\quad \pi(x^*, y^*) = \mathbf{16}$

(3) $(x^*, y^*) = (\mathbf{1}, \mathbf{7}),\quad \pi(x^*, y^*) = \mathbf{27}$

(4) $(x^*, y^*) = (\mathbf{2}, \mathbf{3}),\quad \pi(x^*, y^*) = \mathbf{17}$

(5) $(x^*, y^*) = (\mathbf{4}, \mathbf{1}),\quad \pi(x^*, y^*) = \mathbf{14}$

(6) $(x^*, y^*) = (\mathbf{2}, \mathbf{1}),\quad \pi(x^*, y^*) = \mathbf{7}$

問題 7.2

(1) $(x^*, y^*) = (\mathbf{2}, \mathbf{2}),\quad p^* = \mathbf{6}$

(2) $(x^*, y^*) = (\mathbf{3}, \mathbf{3}),\quad p^* = \mathbf{12}$

(3) $(x^*, y^*) = (\mathbf{4}, \mathbf{3}),\quad p^* = \mathbf{13}$

(4) $(x^*, y^*) = (\mathbf{3}, \mathbf{2}),\quad p^* = \mathbf{6}$

(5) $(x^*, y^*) = (\mathbf{2}, \mathbf{4}),\quad p^* = \mathbf{10}$

(6) $(x^*, y^*) = (\mathbf{5}, \mathbf{3}),\quad p^* = \mathbf{12}$

9 経済数学入門 II (自習用問題・略解)

問題 **9.1**

(1) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{3}{4}$

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

(3) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{x}{y}$

(4) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{3x}{4y}$

(5) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y+2}{x+3}$

(6) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y+2}{x}$

(7) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(8) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y}{x}$

問題 **9.2**

(1) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y}{x}$

(2) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y}{2x}$

(3) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(4) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(5) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(6) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{4y}{x}$

(7) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{x}$

(8) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{4y}{x}$

(9) $\dfrac{f_x(x,y)}{f_y(x,y)} = -\dfrac{y}{x}$

(10) $\dfrac{f_x(x,y)}{f_y(x,y)} = -\dfrac{y}{x}$

問題 **9.3**

(1) $x = y$

(2) $x = y$

(3) $x = y$

(4) $x = 4y$

(5) $x = y$

(6) $x = 4y$

10 経済数学入門 II (自習用問題・略解)

問題 10.1

(1) $(x, y) = (2, 2)$ (2) $(x, y) = (2, 2)$

(3) $(x, y) = (1, 2)$ (4) $(x, y) = (2, 3)$

問題 10.2

(1) $(x, y) = (2, 2)$ (2) $(x, y) = (4, 1)$

(3) $(x, y) = (2, 2)$ (4) $(x, y) = (4, 1)$

(5) $(x, y) = (2, 2)$ (6) $(x, y) = (4, 1)$

問題 10.3

(1) $(x, y) = (2, 2)$ (2) $(x, y) = (3, 1)$

(3) $(x, y) = (2, 2)$ (4) $(x, y) = (1, 2)$

11 経済数学入門 II (自習用問題・略解)

問題 11.1

(1) $(x, y) = (3, 6)$ (2) $(x, y) = (4, 4)$

(3) $(x, y) = (2, 8)$ (4) $(x, y) = (3, 6)$

問題 11.2

(1) $(x, y) = (\dfrac{9}{2}, \dfrac{3}{2})$ (2) $(x, y) = (6, 1)$

(3) $(x, y) = (3, 2)$ (4) $(x, y) = (\dfrac{9}{2}, \dfrac{3}{2})$

問題 11.3

(1) $(x, y) = (8, \dfrac{8}{3})$ (2) $(x, y) = (4, \dfrac{16}{3})$

(3) $(x, y) = (9, 2)$ (4) $(x, y) = (3, 6)$

12 経済数学入門 II (自習用問題・略解)

問題 12.1

(1) 3	(2) 0	(3) −1	(4) −5
(5) 4	(6) −3	(7) −2	*(8) $\dfrac{1}{2}$

問題 12.2

(1) 1	(2) −2	(3) 0	(4) 2
(5) −1	(6) 2	(7) −3	*(8) −2

問題 12.3

(1) 16 桁	(2) 31 桁	(3) 48 桁
(4) 31 桁	(5) 78 桁	(6) 108 桁

13   経済数学入門 II (自習用問題・略解)

問題 13.1

(1) $\dfrac{1}{x}$

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

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

(4) $\dfrac{3x^2}{x^3-4}$

(5) $\dfrac{2}{x}$

(6) $\dfrac{3}{x}$

(7) $-\dfrac{2}{x}$

(8) $\dfrac{1}{3x}$

(9) $\ln(2)$

(10) $\ln(3)$

(11) $\dfrac{8}{2x-3}$

(12) $\dfrac{15x^2}{x^3-4}$

問題 13.2

(1) $f_x(x,y) = \dfrac{3}{x}$, $f_y(x,y) = \dfrac{2}{y}$

(2) $f_x(x,y) = \dfrac{3}{x}$, $f_y(x,y) = \dfrac{4}{y}$

(3) $f_x(x,y) = \dfrac{1}{x}$, $f_y(x,y) = \dfrac{1}{y}$

(4) $f_x(x,y) = \dfrac{1}{x}$, $f_y(x,y) = \dfrac{3}{y}$

(5) $f_x(x,y) = \dfrac{0.4}{x}$, $f_y(x,y) = \dfrac{0.6}{y}$

(6) $f_x(x,y) = \dfrac{0.8}{x}$, $f_y(x,y) = \dfrac{0.2}{y}$

(7) $f_x(x,y) = \dfrac{1}{3x}$, $f_y(x,y) = \dfrac{2}{3y}$

*(8) $f_x(x,y) = \dfrac{1}{x}$, $f_y(x,y) = -\dfrac{1}{y}$

問題 13.3

(1) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y}{x}$

(2) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y}{2x}$

(3) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(4) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(5) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{2y}{3x}$

(6) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{4y}{x}$

(7) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{y}{2x}$

(8) $\dfrac{f_x(x,y)}{f_y(x,y)} = \dfrac{4y}{x}$

問題 13.4

(1) $(x,y) = (10,4)$

(2) $(x,y) = (5,8)$

(3) $(x,y) = (\dfrac{45}{4}, 3)$

(4) $(x,y) = (\dfrac{15}{4}, 9)$