2019 年度　基礎解析 A・基礎解析 B　春休みの課題　略解

注意　課題テスト (2020 年 5 月 7 日 (木) 以降実施) を行う．日程と方法については, 後日 office365 のメール等で連絡する.

1 (1) $x = -1, 2$　(2) $x = \dfrac{3 \pm \sqrt{23}i}{4}$　(3) $x = -\dfrac{1}{4}, \dfrac{2}{3}$
(4) $x = 5$　(5) $x = 2 \pm i$

2 (1) 異なる 2 つの虚数解を持つ　(2) 異なる 2 つの実数解を持つ
(3) 重解を持つ　(4) 異なる 2 つの虚数解を持つ
(5) 異なる 2 つの実数解を持つ　(6) 異なる 2 つの虚数解を持つ

3 (1) $x = -1, 4$　(2) $x = 5$

4 (1) $x = 6$　(2) $x = 3$

5 (1) $\alpha^2 + \beta^2 = -\dfrac{20}{9}$　(2) $\dfrac{1}{\alpha} + \dfrac{1}{\beta} = \dfrac{1}{2}$

6 (1) $x^2 - x - 2 = 0$　(2) $x^2 + 2x - 2 = 0$　(3) $x^2 - 2x + 5 = 0$
(4) $x^2 - 4x + 10 = 0$

7 $k = 0, -8$

8 (1) $x > 7$　(2) $x \leqq \dfrac{2}{11}$　(3) $x \geqq \dfrac{12}{5}$　(4) $x \geqq -\dfrac{5}{2}$

9 $-2 < x \leqq -1$

10 (1) $-1 \leqq x \leqq 7$　(2) $x < -2, x > \dfrac{1}{2}$
(3) $x = -3$　(4) すべての実数
(5) $x \leqq 1 - \sqrt{2}, x \geqq 1 + \sqrt{2}$

11 $m < -4, m > -1$

12 $m < -1$ $m > 1$

13 (1) $(x, y) = (-6, -7)$　(2) $(x, y, z) = (1, 2, -1)$　(3) $(x, y, z) = (5, 3, -2)$

14 (1) $(a, b) = (2, -3)$　(2) $(a, b, c) = (2, -4, 3)$　(3) $(a, b) = (3, -1)$

15 (1) 軸　$x = -1$　頂点　$(-1, 2)$　(2) 軸　$x = 2$　頂点　$(2, 1)$

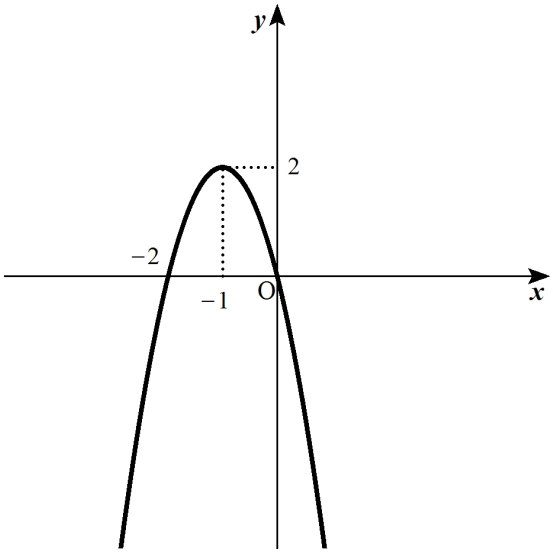

図 1　15 の (1)

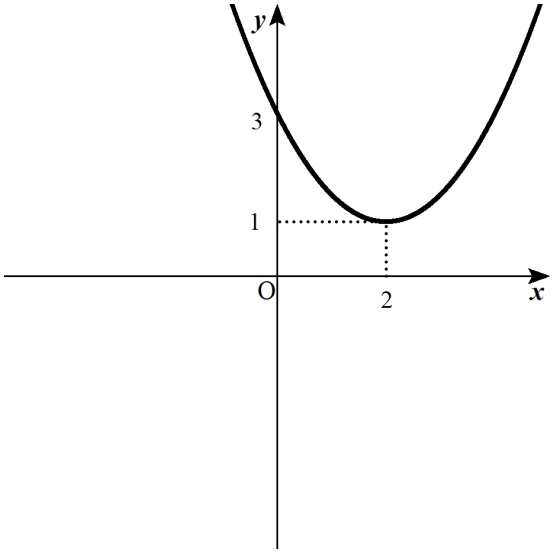

図 2　15 の (2)

16 (1) 標準形　$y = (x-1)^2 + 2$

(2) 標準形　$y = 2\left(x + \dfrac{3}{4}\right)^2 - \dfrac{17}{8}$

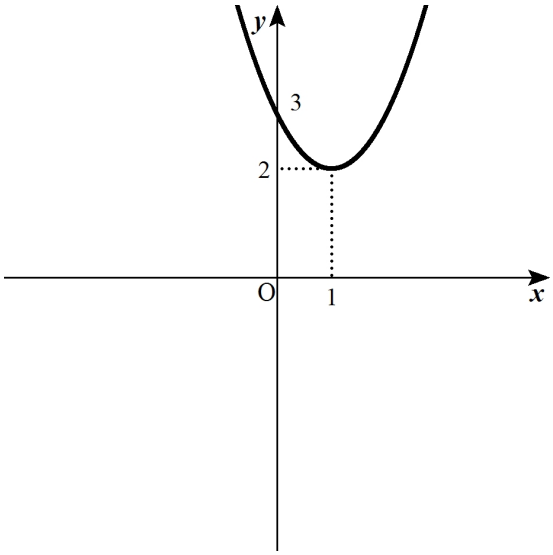

図 3　16 の (1)

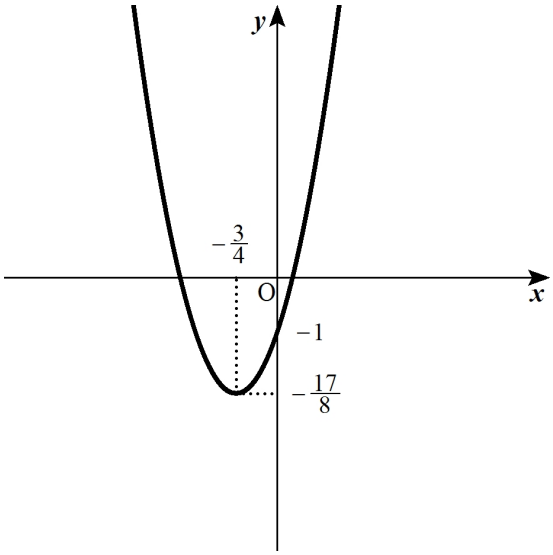

図 4　16 の (2)

(3) 標準形 $y = -2(x-1)^2 - 1$

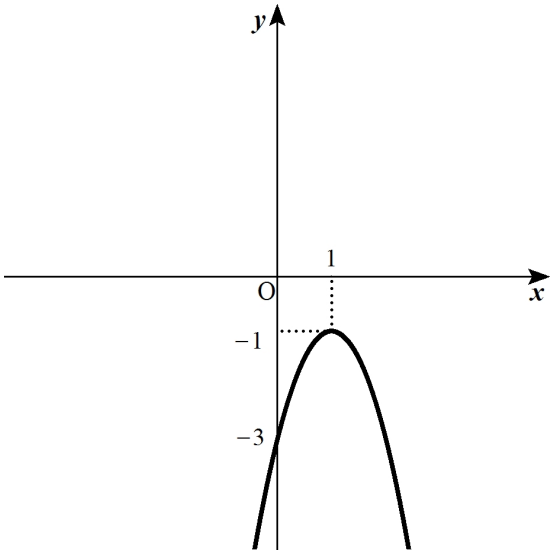

図 5 16 の (3)

(4) 標準形 $y = -3\left(x + \frac{1}{2}\right)^2 - \frac{5}{4}$

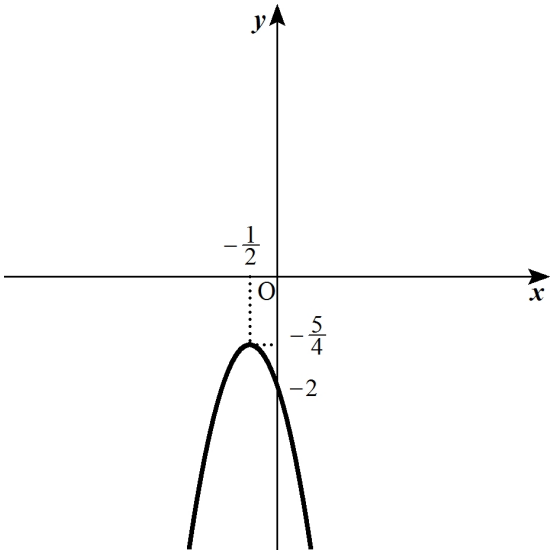

図 6 16 の (4)

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

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

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

18 (1) 最大値はなし. $x = 3$ のとき, 最小値 -2.

(2) $x = 2$ のとき, 最大値 7. 最小値はなし.

19 (1) $x = -1$ のとき, 最大値 8. $x = 2$ のとき, 最小値 -7.

(2) $x = -2$ のとき, 最大値 3. $x = 1$ のとき, 最小値 $-\frac{3}{2}$.

(3) $x = -1$ のとき, 最大値 8. $x = \frac{3}{2}$ のとき, 最小値 $-\frac{3}{4}$.

20 (1) $k > -\frac{1}{4}$

(2) $k = -\frac{1}{4}$

(3) $k < -\frac{1}{4}$

21 (1) 漸近線　$x=-1,\ y=0$

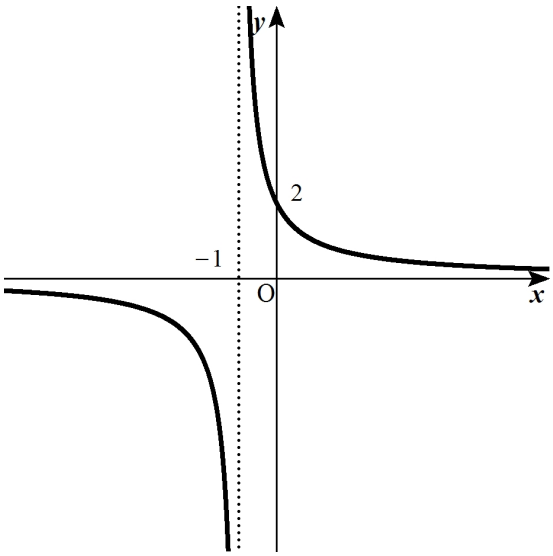

図 7　21 の (1)

(2) 漸近線　$x=0,\ y=-2$

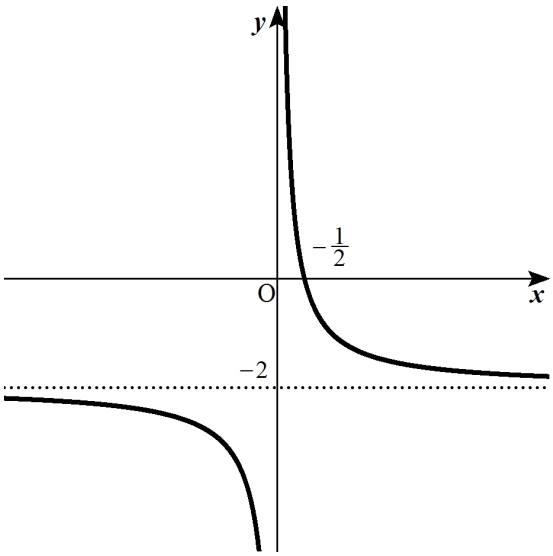

図 8　21 の (2)

(3)　漸近線　$x=-1,\ y=1$

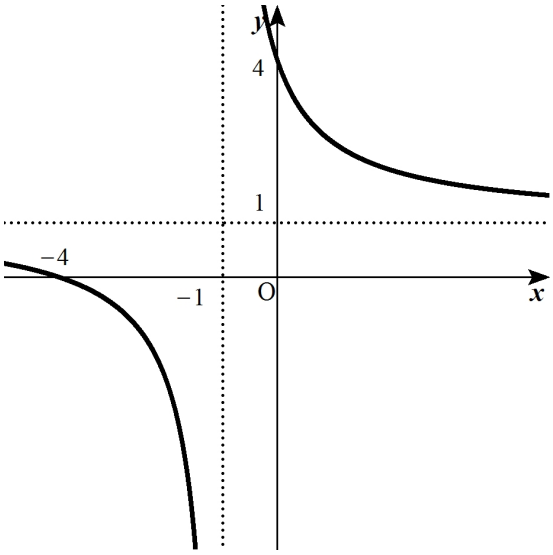

図 9　21 の (3)

(4)　漸近線　$x=1,\ y=-3$

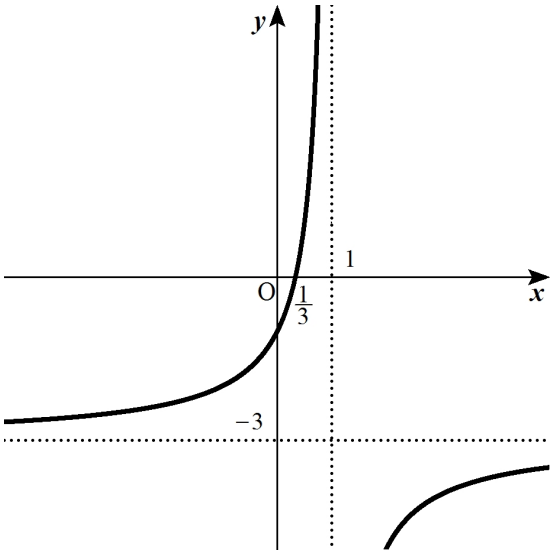

図 10　21 の (4)

22 (1) 定義域　$x \geqq 1$　値域　$y \geqq 0$

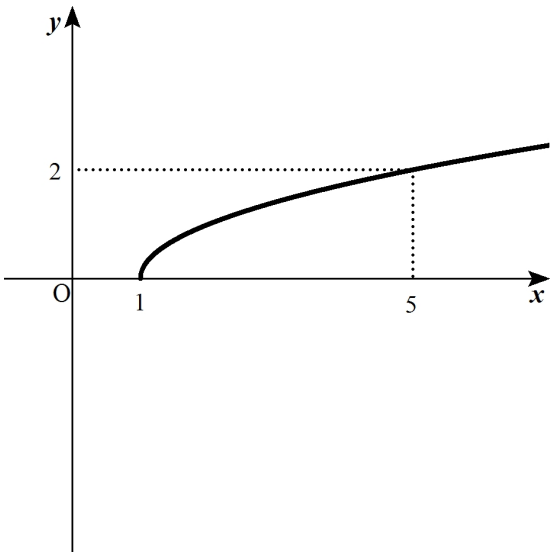

図 11　22 の (1)

(2) 定義域　$x \leqq 0$　値域　$y \geqq -1$

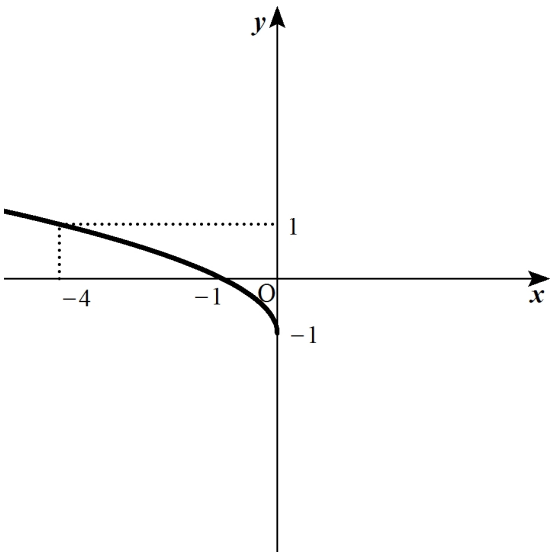

図 12　22 の (2)

(3)　定義域　$x \geqq 1$　値域　$y \leqq 1$

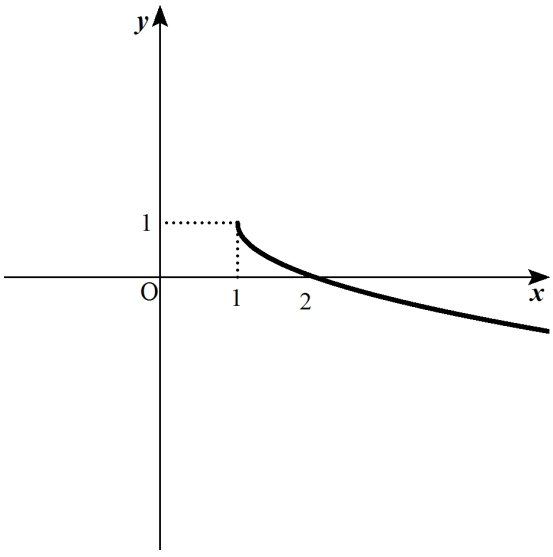

図 13　22 の (3)

(4)　定義域　$x \leqq -1$　値域　$y \leqq 2$

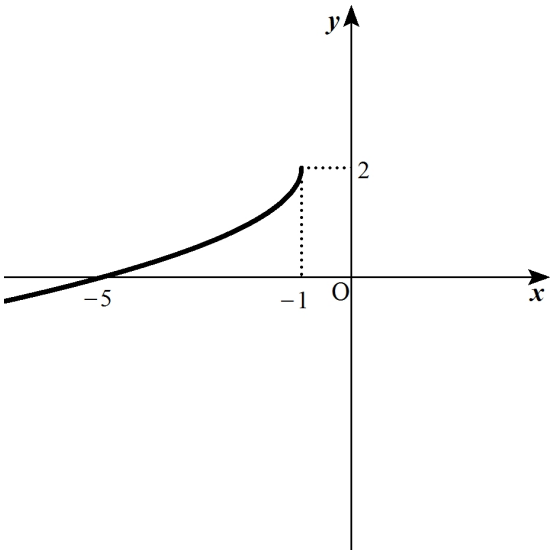

図 14　22 の (4)

23 (1) 定義域　$x > 0$　値域　$y > 1$　$y = 1 + \dfrac{1}{x}$

(2) 定義域　$x \geqq -1$　値域　$y \geqq 0$　$y = \sqrt{\dfrac{x+1}{2}}$

(3) 定義域　$x \leqq 0$　値域　$y \geqq 0$　$y = x^2$

(4) 定義域　$x \geqq -1$　値域　$y \leqq \dfrac{1}{2}$　$y = -\dfrac{1}{2}(x+1)^2 + \dfrac{1}{2}$

24 (1) 8　(2) 9　(3) $2\sqrt[3]{4}$

(4) $\dfrac{4}{3}$　(5) 6　(6) 54

(7) $-2\sqrt{6}$　(8) 3

25 (1) $a^{-\frac{7}{3}}$　(2) $a^{\frac{7}{4}}$　(3) $a^{\frac{2}{3}}$

(4) $a^{-\frac{5}{2}}$　(5) $a^{\frac{12}{7}}$　(6) $a^{\frac{2}{5}}$

26 (1) $\sqrt[8]{a^3}$　(2) $\sqrt[5]{a^{-6}}$　(3) $\sqrt[4]{a^{-3}}$

(4) $\sqrt[4]{a^7}$　(5) $\sqrt[5]{a^{11}}$　(6) $\sqrt[5]{a^{-3}}$

27 (1) 漸近線　x 軸　(2) 漸近線　x 軸

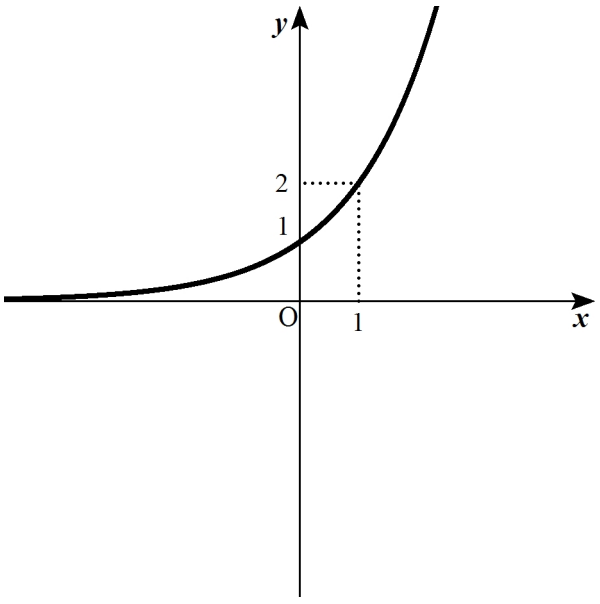

図 15　27 の (1)

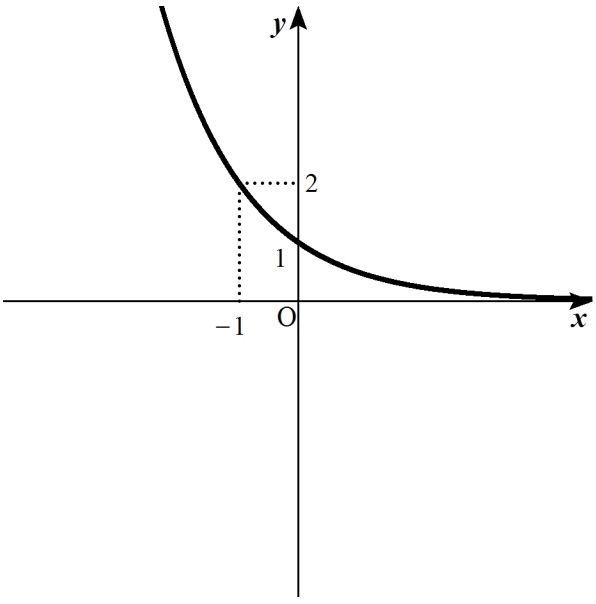

図 16　27 の (2)

(3) 漸近線　$y=1$

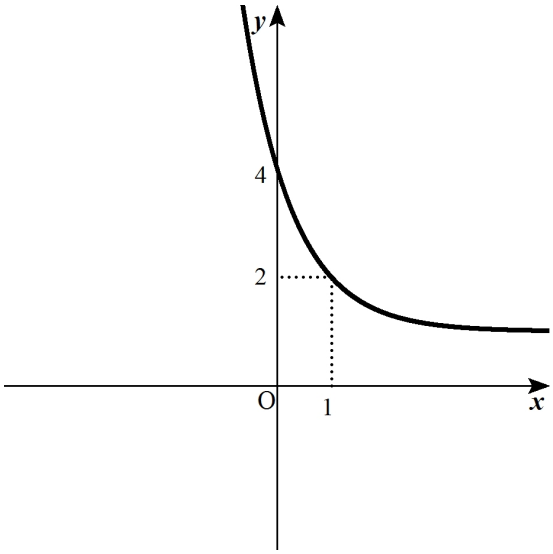

図 17　27 の (3)

(4) 漸近線　$y=-3$

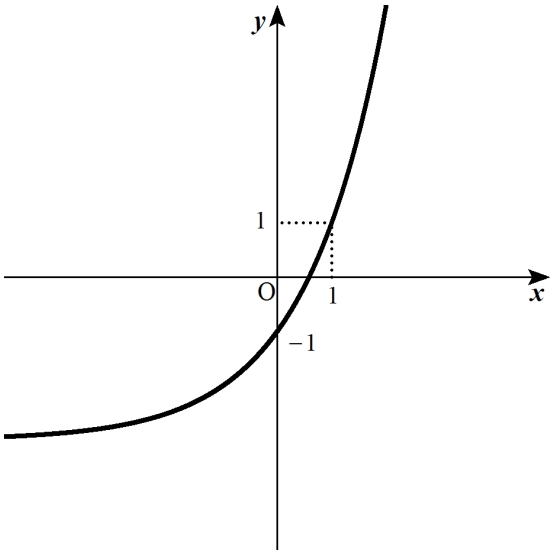

図 18　27 の (4)

28 (1) $x=\dfrac{4}{9}$　(2) $x=\dfrac{13}{6}$　(3) $x=-\dfrac{3}{2}$

29 (1) $x<-3$　(2) $x>4$　(3) $x \leqq -4$　(4) $x \leqq -2$

30 (1) 7　(2) 0　(3) 3

(4) -4　(5) -2　(6) $\dfrac{1}{4}$

(7) $\dfrac{1}{5}$　(8) $\dfrac{3}{5}$

31 (1) 2　(2) 1　(3) 1

(4) 3　(5) -5　(6) $\dfrac{1}{2}$

(7) $\dfrac{1}{2}$　(8) $\dfrac{1}{2}$

32 (1) 2　(2) $\dfrac{4}{3}$　(3) 4　(4) $-\dfrac{9}{2}$

33 (1) 漸近線　y 軸

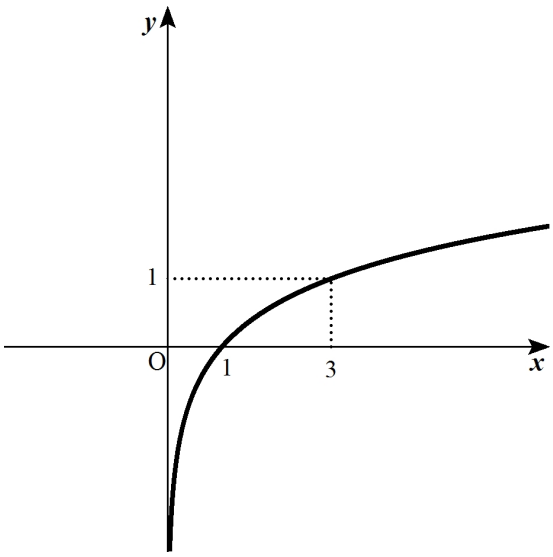

図 19　33 の (1)

(2) 漸近線　y 軸

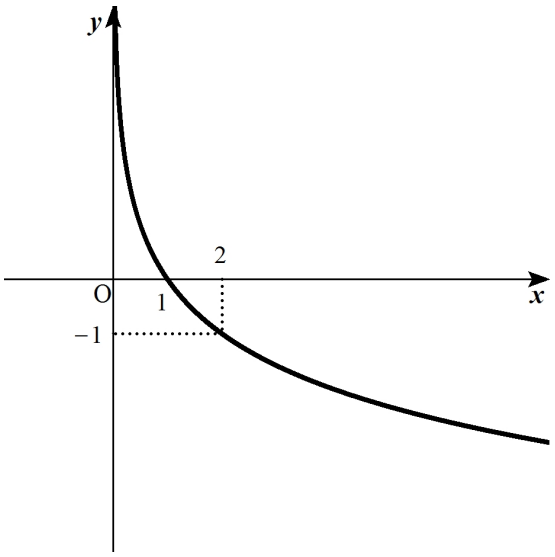

図 20　33 の (2)

(3)　漸近線　$x = 2$

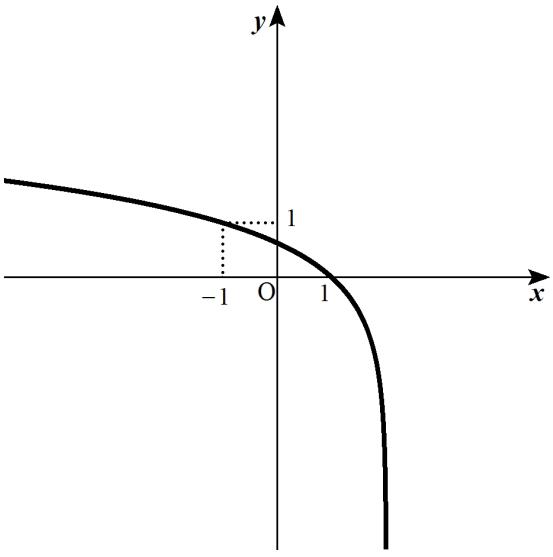

図 21　33 の (3)

(4)　漸近線　$x = 1$

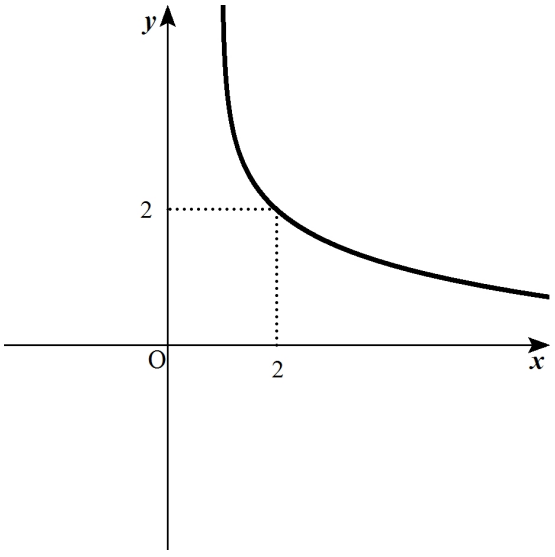

図 22　33 の (4)

34 (1) $x = 2$　　(2) $x = 1$　　(3) $x = 2$　　(4) $x = 3$

35 (1) $x > 8$　(2) $1 < x < 9$
(3) $-1 < x < 2$　(4) $1 < x < 11$

36 (1) -0.6990　(2) 1.3801
(3) 0.6990　(4) 3.1701

37 (1) 9.2×10^{18}　(2) 7.1×10^{-15}

38 (1) $c = 2\sqrt{3}$, $R = \sqrt{6}$

(2) $S = \dfrac{25\sqrt{3}}{2}$, $c = 5\sqrt{7}$

(3) $\cos C = \dfrac{1}{4}$, $\sin C = \dfrac{\sqrt{15}}{4}$, $S = \dfrac{21\sqrt{15}}{4}$

39 (1) $\dfrac{2\pi}{9}$　(2) $-\dfrac{5\pi}{18}$　(3) $\dfrac{7\pi}{6}$
(4) $-\dfrac{37\pi}{9}$　(5) $\dfrac{145\pi}{18}$　(6) $-\dfrac{11\pi}{6}$

40 (1) 60°　(2) -135°　(3) 72°
(4) -20°　(5) 420°　(6) -30°

41 (1) 弦の長さ π, 面積 3π　(2) 中心角 $\dfrac{3}{2}$ [rad], 面積 3

42 (1) $-\dfrac{\sqrt{3}}{2}$　(2) $\dfrac{\sqrt{2}}{2}$　(3) $\sqrt{3}$
(4) $-\dfrac{\sqrt{3}}{2}$　(5) $\dfrac{\sqrt{2}}{2}$　(6) $-\sqrt{3}$
(7) $\dfrac{\sqrt{3}}{2}$　(8) $-\dfrac{\sqrt{2}}{2}$　(9) $-\dfrac{1}{\sqrt{3}}$

43 $\cos\theta = \dfrac{\sqrt{15}}{4}$, $\tan\theta = \dfrac{1}{\sqrt{15}}$

44 $\sin\theta = -\dfrac{2\sqrt{2}}{3}$, $\tan\theta = -2\sqrt{2}$

45 $\cos\theta = -\dfrac{1}{\sqrt{10}}$, $\tan\theta = -\dfrac{3}{\sqrt{10}}$

46 (1) π　(2) 2π　(3) 2π
(4) π　(5) π　(6) $\dfrac{\pi}{3}$

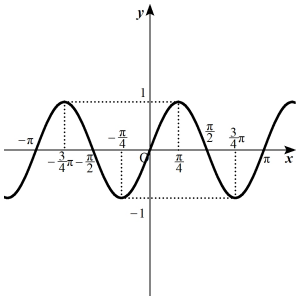

図 23　46 の (1)

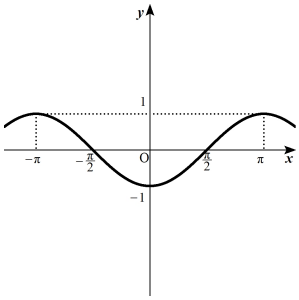

図 24　46 の (2)

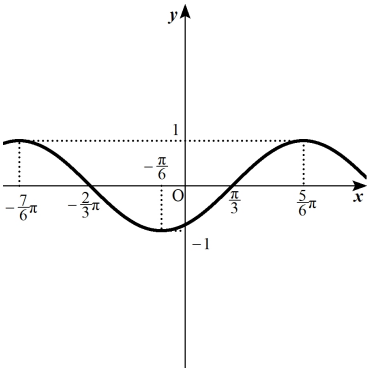

図 25　46 の (3)

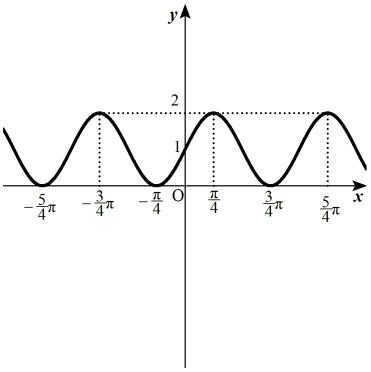

図 26　46 の (4)

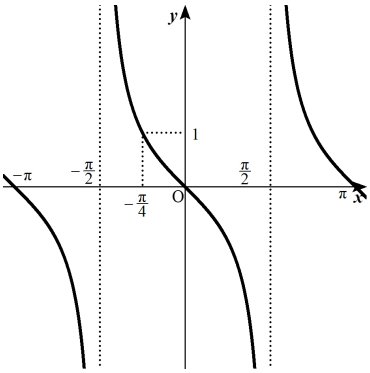

図 27　46 の (5)

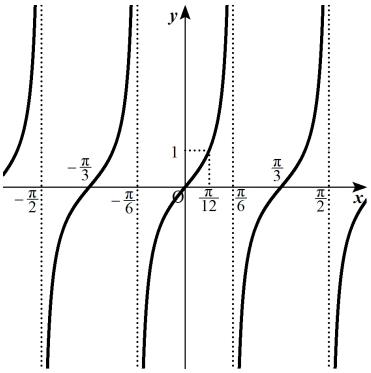

図 28　46 の (6)

47 (1) $x = \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$ (2) $x = \dfrac{5\pi}{6}, \dfrac{7\pi}{6}$

(3) $x = \dfrac{\pi}{6}, \dfrac{7\pi}{6}$ (4) $0 < x < \dfrac{\pi}{6}, \dfrac{5\pi}{6} < x < 2\pi$

(5) $\dfrac{\pi}{3} \leqq x \leqq \dfrac{5\pi}{3}$ (6) $\dfrac{\pi}{4} \leqq x < \dfrac{\pi}{2}, \dfrac{5\pi}{4} \leqq x < \dfrac{3\pi}{2}$

48 $\sin 105^\circ = \dfrac{\sqrt{6}+\sqrt{2}}{4}$, $\cos 105^\circ = -\dfrac{\sqrt{6}-\sqrt{2}}{4}$, $\tan 105^\circ = -2-\sqrt{3}$

49 (1) $-\dfrac{7\sqrt{3}+2\sqrt{2}}{15}$ (2) $\dfrac{2\sqrt{7}+\sqrt{42}}{15}$ (3) $\dfrac{25\sqrt{14}-18\sqrt{21}}{14}$

50 (1) $\dfrac{24}{25}$ (2) $\dfrac{7}{25}$ (3) $\dfrac{24}{7}$ (4) $\dfrac{1}{\sqrt{10}}$ (5) $\dfrac{3}{\sqrt{10}}$ (6) $\dfrac{1}{3}$

51 (1) $\dfrac{16\sqrt{5}-3}{45}$ (2) $-\dfrac{4+12\sqrt{5}}{45}$ (3) $-\dfrac{243-25\sqrt{5}}{176}$

52 (1) $\dfrac{1}{2}(\sin 5\theta - \sin 3\theta)$ (2) $-\dfrac{1}{2}(\cos 10\theta - \cos 4\theta)$

(3) $\dfrac{1}{2}(\cos 7\theta + \cos 3\theta)$ (4) $\dfrac{1}{2}(\sin 5\theta + \sin \theta)$

53 (1) $2\cos 4\theta \sin \theta$ (2) $2\sin 3\theta \sin \theta$ (3) $2\cos 3\theta \cos 2\theta$ (4) $2\sin 2\theta \cos \theta$

54 (1) $y = \sqrt{2}\sin\left(x - \dfrac{\pi}{4}\right)$ (2) $y = 2\sqrt{3}\sin\left(x + \dfrac{\pi}{3}\right)$

(3) $y = 2\sqrt{3}\sin\left(x - \dfrac{\pi}{6}\right)$ (4) $y = \sqrt{2}\sin\left(x + \dfrac{3\pi}{4}\right)$

55 (1) $\pm 2\vec{a}$ (2) $\dfrac{8}{3}\vec{a}$ (3) $-\dfrac{1}{5}\vec{a}$

56 (1) $-15\vec{a} - 10\vec{b}$ (2) $7\vec{a} + \vec{b}$ (3) $-\vec{a} + 3\vec{b}$

(4) $-8\vec{a} - 9\vec{b}$ (5) $8\vec{a} - \dfrac{1}{6}\vec{b}$

57 (1) $\dfrac{2\vec{a}+3\vec{b}}{5}$ (2) $\dfrac{3\vec{a}+5\vec{b}}{8}$ (3) $\dfrac{5\vec{a}+3\vec{b}}{8}$

58 (1) $\begin{pmatrix} -1 \\ 9 \end{pmatrix}$ $\sqrt{82}$ (2) $\begin{pmatrix} 6 \\ -8 \end{pmatrix}$ 10 (3) $\begin{pmatrix} 13 \\ -2 \end{pmatrix}$ $\sqrt{173}$

(4) $\begin{pmatrix} -\dfrac{5}{6} \\ \dfrac{11}{3} \end{pmatrix}$ $\dfrac{\sqrt{509}}{6}$ (5) $\begin{pmatrix} 1 \\ 37 \end{pmatrix}$ $\sqrt{1370}$

59 (1) $\begin{pmatrix}5\\4\end{pmatrix}$ $\sqrt{41}$ (2) $\begin{pmatrix}-8\\2\end{pmatrix}$ $2\sqrt{17}$

60 (1) $\begin{pmatrix}1\\5\\-2\end{pmatrix}$ $\sqrt{30}$ (2) $\begin{pmatrix}-2\\-3\\5\end{pmatrix}$ $\sqrt{38}$ (3) $\begin{pmatrix}12\\-6\\-12\end{pmatrix}$ 18

(4) $\begin{pmatrix}\frac{2}{3}\\\frac{13}{6}\\-\frac{3}{2}\end{pmatrix}$ $\frac{\sqrt{266}}{6}$ (5) $\begin{pmatrix}-3\\9\\-12\end{pmatrix}$ $3\sqrt{26}$

61 (1) $\begin{pmatrix}2\\1\\-1\end{pmatrix}$ (2) $\begin{pmatrix}-1\\5\\0\end{pmatrix}$ (3) $\begin{pmatrix}-3\\4\\1\end{pmatrix}$

62 (1) $k=-6$ (2) $k=-3,2$ (3) $k=-2$, $l=-2$

(4) $k=\frac{3}{4}$, $l=\frac{3}{4}$

63 t は媒介変数とする.

(1) $\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}1\\-2\end{pmatrix}+t\begin{pmatrix}2\\-1\end{pmatrix}$, $x=1+2t$, $y=-2-t$, $\frac{x-1}{2}=\frac{y+2}{-1}$

(2) $\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}2\\-3\end{pmatrix}+t\begin{pmatrix}3\\5\end{pmatrix}$, $x=2+3t$, $y=-3+5t$, $\frac{x-2}{3}=\frac{y+3}{5}$

(3) $\begin{pmatrix}x\\y\\z\end{pmatrix}=\begin{pmatrix}4\\3\\-5\end{pmatrix}+t\begin{pmatrix}1\\1\\-3\end{pmatrix}$, $x=4+t$, $y=3+t$, $z=-5-3t$,

$x-4=y-3=\frac{z+5}{-3}$

(4) $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 3 \\ 1 \\ -2 \end{pmatrix} + t \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix}$, $x = 3 + 2t$, $y = 1 - t$, $z = -2 + 3t$,

$$\frac{x-3}{2} = \frac{y-1}{-1} = \frac{z+2}{3}$$

64 t は媒介変数とする.

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

(3) $x - 1 = \dfrac{y+4}{-5} = \dfrac{z-2}{-6}$ (4) $x - 2 = \dfrac{y-4}{-2} = \dfrac{z-3}{-2}$

(5) $x - 2 = \dfrac{y-4}{-2}$, $z = 3$ (6) $x = 2$, $y = \dfrac{z-3}{-4}$

65 $x = 8$, $y = 2$, $z = -2$

66 (1) $y = -4x + 6$ (2) $y = -x + 5$ (3) $x = 1$

67 $x + 2y - 3 = 0$

68 $x + 2y - 9 = 0$

69 $(8, 1)$

70 (1) $(x+2)^2 + (y-1)^2 = 4$ (2) $(x-1)^2 + (y-1)^2 = 5$

(3) $(x-3)^2 + (y+2)^2 = 10$

71 中心 $\left(-\dfrac{3}{2}, -\dfrac{1}{2}\right)$, 半径 $\dfrac{\sqrt{10}}{2}$

72 (1) $x^2 + y^2 = 5$ (2) $x^2 + y^2 - 6x + 4y - 3 = 0$

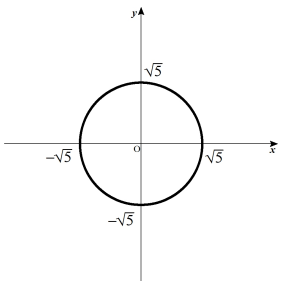

図 29 72 の (1)

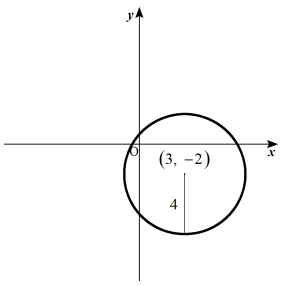

図 30 72 の (2)

73 (1) 頂点 $(\pm 2, 0)$, $(0, \pm 1)$, 焦点の座標 $(\pm\sqrt{3}, 0)$, 焦点からの距離 4

(2) 頂点 $(\pm 1, 0)$, $(0, \pm 3)$, 焦点の座標 $(0, \pm 2\sqrt{2})$, 焦点からの距離 6

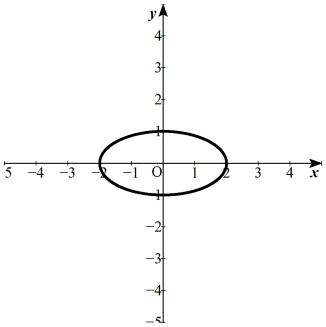

図 31　73 の (1)

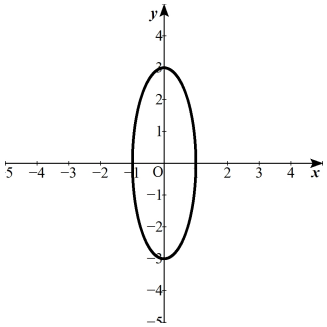

図 32　73 の (2)

74 (1) 頂点 $(0, \pm 1)$, 焦点の座標 $(0, \pm\sqrt{2})$, 焦点からの距離 2

(2) 頂点 $(\pm 1, 0)$, 焦点の座標 $(\pm\sqrt{2}, 0)$, 焦点からの距離 2

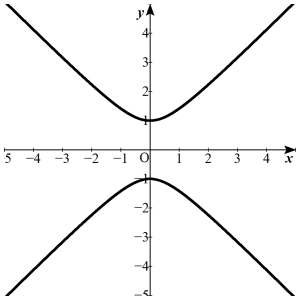

図 33　74 の (1)

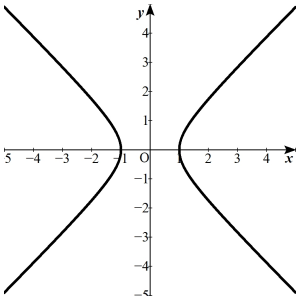

図 34　74 の (2)

75 焦点 $(3, 0)$ 準線の方程式 $x = -3$

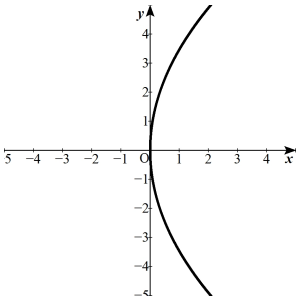

図 35　75

76 $\left(\dfrac{\sqrt{2}}{2}, -\dfrac{\sqrt{2}}{2}\right), \left(-\dfrac{\sqrt{2}}{2}, \dfrac{\sqrt{2}}{2}\right)$

77 (1) $k = 2\sqrt{2}$ のとき, 接点 $(-\sqrt{2}, \sqrt{2})$, $k = -2\sqrt{2}$ のとき, 接点 $(\sqrt{2}, -\sqrt{2})$

(2) $-2\sqrt{2} < k < 2\sqrt{2}$

78 (1) $y > -2x + 1$

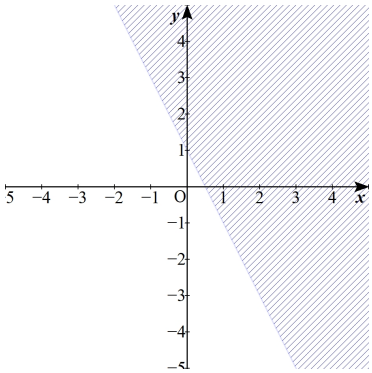

図 36　境界は含まない

(2) $4x + 3y \leqq 12$

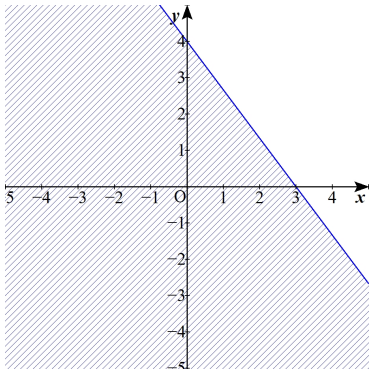

図 37　境界は含む

(3) $y < (x-3)^2$

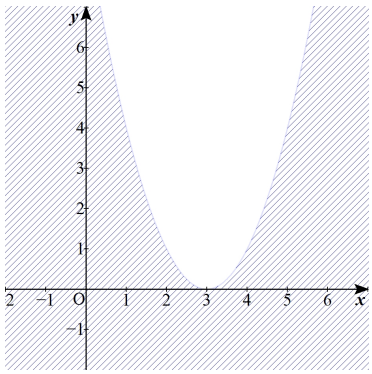

図 38　境界は含まない

(4) $x^2 + 2x + y - 1 \leqq 0$

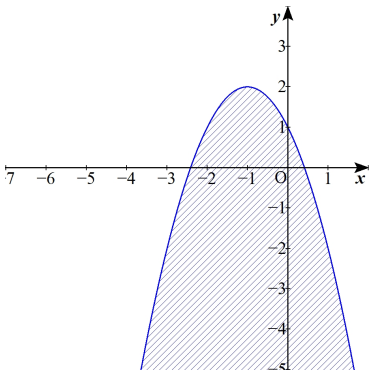

図 39　境界は含む

(5)　$x^2+y^2 \leqq 9$

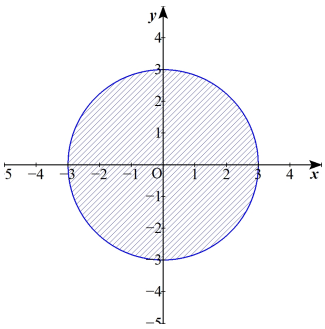

図 40　境界を含む

(6)　$(x-1)^2+(y+1)^2>4$

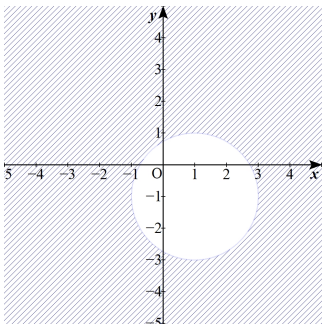

図 41　境界を含まない

(7)　$9x^2+25y^2>25$

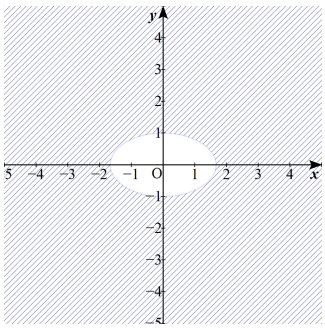

図 42　境界を含まない

(8)　$x^2+y^2+2x-2y+1<0$

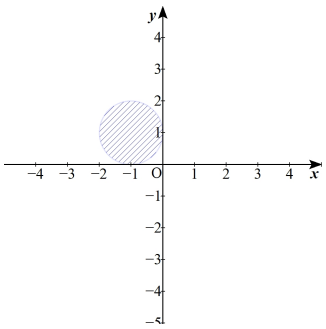

図 43　境界を含まない

79 (1)　$\begin{cases} x-3y-9<0 \\ 2x+3y-6>0 \end{cases}$

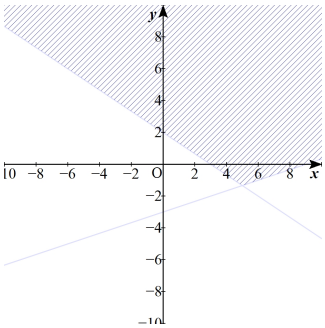

図 44　境界を含まない

(2)　$\begin{cases} x-y+2>0 \\ x^2+y^2<4 \end{cases}$

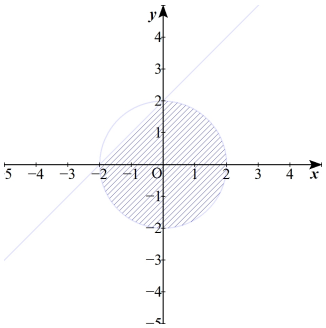

図 45　境界を含まない

(3) $\begin{cases} x^2+4y^2 \leqq 9 \\ 4x^2+y^2 \geqq 9 \end{cases}$

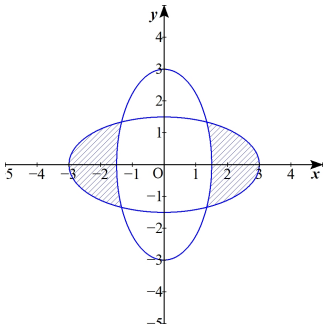

図 46　境界を含む

(4) $1 < x^2+y^2 \leqq 4$

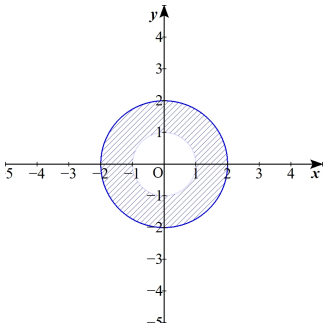

図 47　$x^2+y^2=4$ の境界を含むが $x^2+y^2=1$ の境界は含まない

80 $x=4,\ y=0$ のとき, $x-y$ の最大値は 4