

# 問 の 解 答

## 1 章

- 問 1. (1)  $25x^2 - 30x + 9$  (2)  $4x^2 - 9y^2$   
(3)  $x^2 + 4x - 12$  (4)  $6x^2 + 5x - 6$   
(5)  $20x^2 - 19x + 3$  (6)  $x^3 + x^2 - x - 1$   
(7)  $a^2 + b^2 - 2ab + 8a - 8b + 16$  (8)  $a^4 - 2a^2b^2 + b^4$
- 問 2. (1)  $x(x + 7)$  (2)  $(x + 6)(x - 6)$   
(3)  $(x - 2)(x + 9)$  (4)  $(4x - 1)(x - 1)$   
(5)  $(2x + 5)(3x - 2)$  (6)  $x(x + 2)(x - 4)$   
(7)  $(3x + 4)(x + 2)$  (8)  $(5x + 9)(x - 1)$   
(9)  $(x - 1)(3x + 1)$  (10)  $(2x + 3y)^2$   
(11)  $(x + 1)(y + 1)$  (12)  $2xy(x + 2y)(x - 2y)$
- 問 3. (1)  $x^3 + 12x^2 + 48x + 64$  (2)  $125a^3 - 150a^2b + 60ab^2 - 8b^3$   
(3)  $x^3 + 27y^3$  (4)  $64a^3 - 27b^3$
- 問 4. (1)  $(a + 2b)^3$  (2)  $(x - 6y)(x^2 + 6xy + 36y^2)$   
(3)  $(3a - 2)^3$  (4)  $2(x + 3y)(x^2 - 3xy + 9y^2)$
- 問 5. (1)  $-\frac{xy}{x^2 - xy + y^2}$  (2)  $\frac{x + 1}{x(x + 4)}$  (3)  $\frac{(x + 5)(x - 2)}{(x + 7)(x - 4)}$   
(4)  $\frac{x + 11}{(x - 1)(x + 2)}$  (5)  $\frac{1}{x(x - 1)}$  (6)  $\frac{3}{(x - 1)(x + 2)}$   
(7)  $\frac{(x + 2)(2x - 5)}{(x - 3)(x - 1)}$  (8)  $\frac{1}{x - 1}$
- 問 6. (1)  $5\sqrt{6}$  (2)  $2\sqrt{10}$  (3)  $3\sqrt{7}$  (4) 1  
(5)  $24 - 12\sqrt{3}$  (6)  $14 - 2\sqrt{5}$  (7)  $7 + 5\sqrt{2}$  (8)  $26 - 15\sqrt{3}$

2 問 の 解 答

問 7. (1)  $3\sqrt{2}$     (2)  $2\sqrt{6} + 3\sqrt{2}$     (3)  $9 + 2\sqrt{15}$   
 (4)  $-7 - 4\sqrt{3}$     (5)  $\frac{3 + \sqrt{5}}{2}$     (6)  $\frac{\sqrt{21} + \sqrt{7}}{2}$

問 8. (1)  $x - \sqrt{x^2 - 1}$     (2)  $\frac{4\sqrt{x}}{1 - x}$

問 9. (1)  $x = -\frac{5}{6}$     (2)  $x = 4 - \sqrt{15}$

問 10. (1)  $x = 12, y = -4$     (2)  $x = \frac{11}{6}, y = \frac{3}{2}$   
 (3)  $x = 2, y = -2, z = -1$     (4)  $x = 1, y = \frac{1}{2}, z = -\frac{3}{2}$

問 11. (1)  $x > 3$     (2)  $x \leq -4$     (3)  $x > -\frac{1}{5}$   
 (4)  $x \leq \frac{4}{3}$     (5)  $x \leq -2 - \sqrt{3}$     (6)  $x > 4 + 3\sqrt{2}$

問 12. (1)  $-5 < x \leq -2$     (2)  $x > 4$     (3)  $x < -6$     (4) 解なし  
 (5)  $-17 \leq x < 0$     (6)  $\frac{7}{2} \leq x < 2\sqrt{2} + \sqrt{3}$     (7)  $x \leq -\frac{13}{2}$     (8)  $x > \frac{1}{8}$

問 13. (1) 500 円の品物を  $x$  個買うとする。問題の条件を不等式で表すと

$$500x \times 0.93 + 600 < 500x$$

これを解くと、 $x > \frac{600}{35} = \frac{120}{7} = 17.1\dots$

よって、問題の条件を満たすのは 18 個以上買うときである。

(2) 原価を  $x$  円とする。問題の条件を連立不等式で表すと

$$1.15x \leq 1.3x - 300 \leq 1.2x$$

これを解いて、 $2000 \leq x \leq 3000$

よって、原価の範囲は 2000 円以上 3000 円以下である。

問 14. (1)  $x = -\frac{1}{2}, \frac{4}{3}$     (2)  $x = \frac{1}{2}, \frac{1}{5}$     (3)  $x = \frac{1}{2}$     (4)  $x = 0, -\frac{1}{\sqrt{3}}$   
 (5)  $x = \frac{1}{3}, 1$     (6)  $x = -15, 9$     (7)  $x = -3 \pm \sqrt{7}$   
 (8)  $x = \frac{3 \pm \sqrt{13}}{2}$     (9)  $x = \frac{-1 \pm \sqrt{7}}{3}$     (10)  $x = \frac{1 \pm \sqrt{13}}{4}$   
 (11)  $x = -\sqrt{3}, \frac{\sqrt{3}}{2}$     (12)  $x = \frac{-\sqrt{5} \pm 1}{2}$

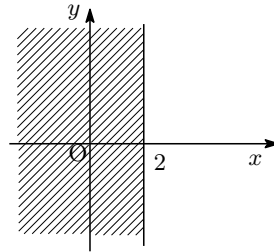
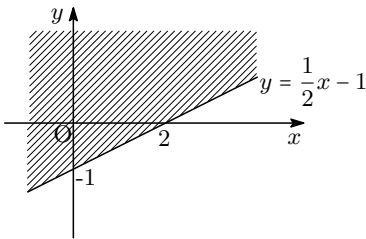
問 15. (1)  $x = \pm\sqrt{2}i$       (2)  $x = 2 \pm i$

問 16. (1) 商  $x+1$  余り  $2x-3$       (2) 商  $2x^2+3x+8$  余り 27

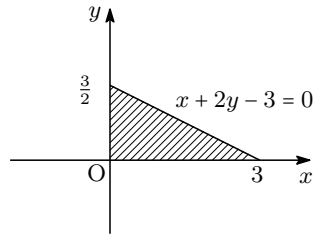
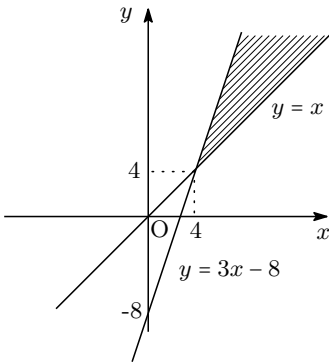
問 17. (1)  $x = -3, -2, 1$       (2)  $x = -3, -1, 2$   
 (3)  $x = 2, 2 \pm \sqrt{3}$       (4)  $x = 1, -1 \pm \sqrt{3}i$   
 (5)  $x = -\frac{1}{3}, \frac{3 \pm \sqrt{5}}{2}$       (6)  $x = 2, \frac{3}{2}, -\frac{1}{2}$   
 (7)  $x = -1, 2, -1 \pm \sqrt{6}$       (8)  $x = 1, -2, \frac{1 \pm \sqrt{3}i}{2}$

問 18. (1)  $y = -2x+2$       (2)  $y = -\frac{4}{3}x + \frac{7}{3}$       (3)  $y = -4x+9$   
 (4)  $y = \frac{3}{4}x-3$       (5)  $y = 6, x = -5$

問 19. (1)      (2)

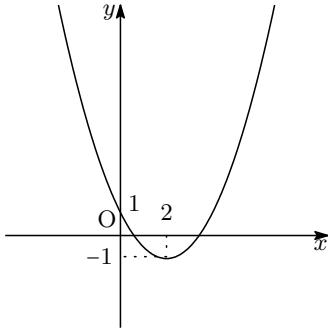


問 20. (1)      (2)



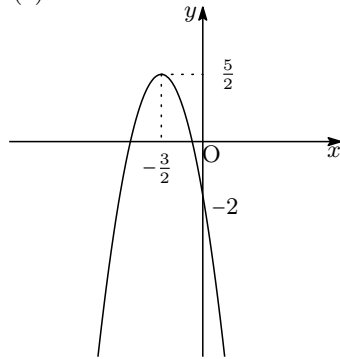
問 21. (1) 軸 :  $x = 2$ , 頂点 :  $(2, -1)$

(1)



(2) 軸 :  $x = -\frac{3}{2}$ , 頂点 :  $(-\frac{3}{2}, \frac{5}{2})$

(2)



問 22. (1)  $-4 < x < 1$       (2)  $x \leq -3, -2 \leq x$

(3)  $x < -2, 2 < x$       (4)  $-2 \leq x \leq 3/2$

(5)  $-2 < x < 5$       (6)  $x < -1/2, 2 < x$

(7)  $x < \frac{-1-\sqrt{3}}{2}, \frac{-1+\sqrt{3}}{2} < x$       (8)  $\frac{3-\sqrt{17}}{2} \leq x \leq \frac{3+\sqrt{17}}{2}$

(9) 解なし      (10)  $x < \frac{2-\sqrt{7}}{3}, \frac{2+\sqrt{7}}{3} < x$

(11) すべての実数      (12)  $x = \frac{5}{2}$

問 23. (1) 169      (2)  $\frac{1}{2}$       (3) 16      (4) 2      (5) 0.2

(6) 243      (7) 4      (8)  $\frac{3}{2}$       (9) 49      (10)  $6\sqrt[3]{5}$

(11) 2      (12)  $\sqrt{2}$       (13) 3      (14) -1

問 24. (1)  $a\sqrt[6]{a}$       (2)  $\sqrt[8]{a^7}$       (3)  $\frac{1}{\sqrt[12]{a}}$       (4) 1      (5)  $\sqrt[12]{a^{11}}$

問 25. (1)  $\frac{1}{5}$       (2)  $\frac{1}{2}$       (3)  $\frac{1}{27}$       (4) 3

(5)  $\frac{1}{4}$       (6) 2      (7) 1      (8)  $\sqrt{6}$

問 26. (1)  $x = \frac{4}{3}$       (2)  $0 < x < 3$

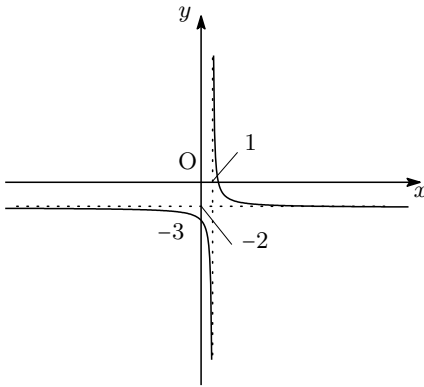
問 27. (1) 4      (2)  $-\frac{1}{2}$       (3) -4

- 問 28. (1) 2      (2)  $\frac{3}{2}$       (3) 1      (4)  $\frac{13}{6}$       (5)  $\frac{5}{2}$   
 (6)  $-\frac{1}{6}$       (7)  $\frac{3}{4}$       (8)  $\frac{3}{2}$       (9)  $\frac{2}{15}$       (10)  $\frac{5}{2}$

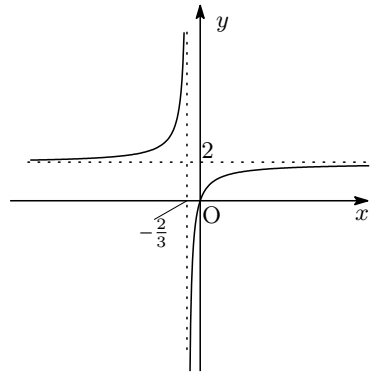
- 問 29. (1) 83      (2)  $-\frac{3}{4}$

問 30.

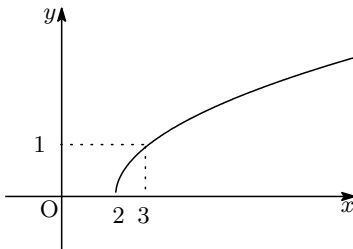
(1) 漸近線は  $x = 1$ ,  $y = -2$



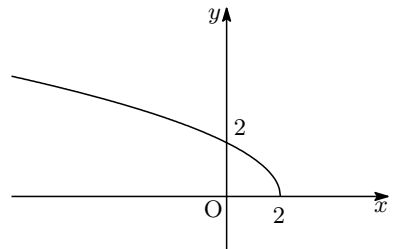
(2) 漸近線は  $x = -\frac{2}{3}$ ,  $y = 2$



問 31. (1) 定義域:  $x \geq 2$ , 値域:  $y \geq 0$



(2) 定義域:  $x \leq 2$ , 値域:  $y \geq 0$



## 2 章

問 1. (1)  $a_n = 3n + 2$ ,  $a_{10} = 32$       (2)  $a_n = -2n + 4$ ,  $a_{10} = -16$

問 2. (1)  $-320$       (2)  $910$

問 3. (1)  $a_n = 2 \cdot 3^{n-1}$ ,  $a_7 = 1458$       (2)  $a_n = -4 \cdot (-1)^{n-1}$ ,  $a_7 = -4$

(3)  $a_n = 18 \cdot \left(\frac{2}{3}\right)^{n-1}$ ,  $a_7 = \frac{128}{81}$

問 4. (1)  $-364$       (2)  $\frac{121}{3}$

問 5. (1)  $\frac{2}{3}\{1 - (-2)^n\}$       (2)  $2\left\{\left(\frac{3}{2}\right)^n - 1\right\}$

問 6.  $\frac{1}{6}n(n+1)(4n-1)$

問 7. (1)  $\infty$       (2)  $0$       (3)  $0$

問 8. (1)  $-\infty$       (2)  $\frac{1}{2}$       (3)  $0$

問 9. (1) 収束,  $\frac{3}{5}$       (2) 発散

問 10. (1)  $a_n = 2n^2 - n + 1$       (2)  $a_n = 2^{n-1} - 2$

問 11. (1)  $a_n = 2n + 1$       (2)  $a_n = 3 \cdot 2^{n-1}$

問 12. (1)  $a_n = \frac{1}{3}\{7 - (-2)^n\}$       (2)  $a_n = \frac{1}{2}n(n+3)$

問 13. (1)  $a_n = 2 \cdot 3^{n-1} + 2$       (2)  $a_n = (-2)^{n-1} + 4$

## 3 章

問 1. (1) 3 (2) 2 (3) 3 (4) 3 (5)  $\frac{1}{2}$  (6)  $-\frac{2}{3}$  (7)  $\frac{1}{6}$  (8)  $\frac{1}{4}$

問 2. (1) 1 (2)  $\infty$  (3)  $\infty$  (4) 8 (5) 0

問 3. (1) -1 (2)  $\infty$  (3)  $\infty$

問 4. (1)  $y' = 3$  (2)  $y' = -6x + 5$  (3)  $y' = -2x^2 + 2x$   
 (4)  $y' = 3x^2 + 4x + 1$  (5)  $y' = 9x^2 - 8x + 9$  (6)  $y' = -4x^3 + 6x^2$

問 5. (1)  $f'(2) = -8$ ,  $f'(-1) = 1$  (2)  $f'(2) = 19$ ,  $f'(-1) = 1$

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

## 問 7.

$x$	...	1	...	3	...
$y'$	+	0	-	0	+
$y$	↗	極大 5	↘	極小 1	↗

$x = 1$  で極大値 5,  $x = 3$  で極小値 1 をとる.

$x$	...	-1	...	2	...
$y'$	-	0	+	0	-
$y$	↘	極小 -17	↗	極大 10	↘

$x = 2$  で極大値 10,  $x = -1$  で極小値 -17 をとる.

$x$	...	1	...
$y'$	+	0	+
$y$	↗	3	↗

極値なし

## 問 8.

$x$	...	-1	...	1	...
$y'$	+	0	-	0	+
$y$	↗	極大 4	↘	極小 0	↗

$x = -1$  で極大値 4,  $x = 1$  で極小値 0 をとる.

	$x$	...	2	...	
(2)	$y'$	-	0	-	極値なし
	$y$	↘	0	↘	

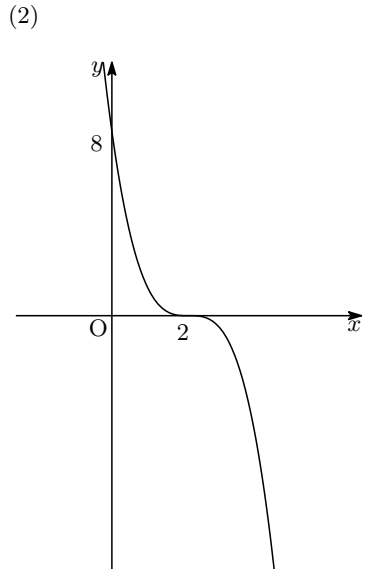
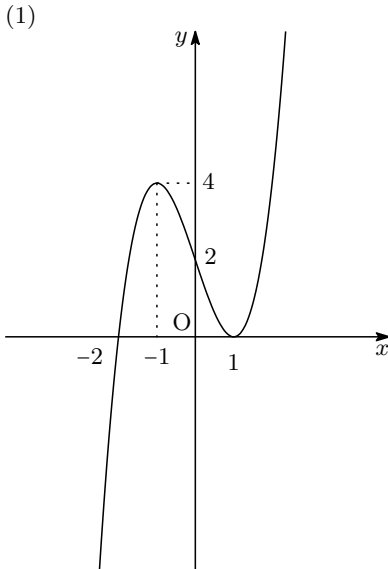
	$x$	...	-1	...	0	...	1	...
(3)	$y'$	-	0	+	0	-	0	+
	$y$	↘	極小 -4	↗	極大 -3	↘	極小 -4	↗

$x = 0$  で極大値  $-3$ ,  $x = -1, 1$  で極小値  $-4$  をとる.

	$x$	...	-2	...	0	...	1	...
(4)	$y'$	-	0	+	0	-	0	+
	$y$	↘	極小 -32	↗	極大 0	↘	極小 -5	↗

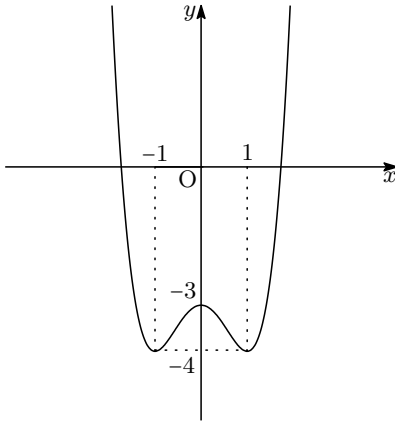
$x = 0$  で極大値  $0$ ,  $x = -2$  で極小値  $-32$ ,  $x = 1$  で極小値  $-5$  をとる.

(1)~(4) のグラフの概形は以下のとおり.

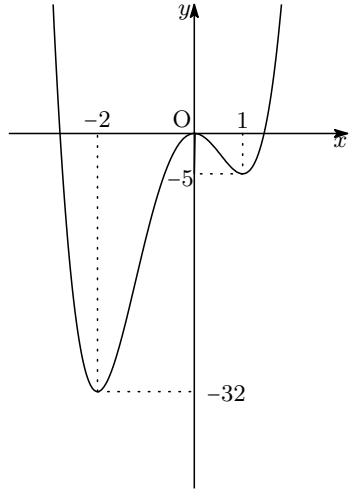




(3)



(4)



- 問 9. (1)  $y' = 9x^2 - 16x + 1$       (2)  $y' = 6x^2 - 2x + 3$   
 (3)  $y' = 8x^3 + 12x^2 - 6x - 5$

- 問 10. (1)  $y' = -\frac{6}{(2x-3)^2}$       (2)  $y' = -\frac{2x^2-1}{(2x^2+1)^2}$       (3)  $y' = \frac{x(x+2)}{(x+1)^2}$

- 問 11. (1)  $y' = -\frac{1}{x^2}$       (2)  $y' = -\frac{9}{x^4}$       (3)  $y' = \frac{3}{x^7}$

- 問 12. (1)  $y' = 18(3x-2)^5$       (2)  $y' = 24x(3x^2-1)^3$   
 (3)  $y' = -5(1-x)^4$       (4)  $y' = 4(6x^2+1)(2x^3+x-1)^3$   
 (5)  $y' = -\frac{5}{(x-1)^6}$       (6)  $y' = \frac{8}{(5-2x)^5}$   
 (7)  $y' = -\frac{2(2x-1)}{(x^2-x+1)^3}$       (8)  $y' = 3\left(1-\frac{1}{x^2}\right)\left(x+\frac{1}{x}\right)^2$

- 問 13. (1)  $y' = \frac{3\sqrt{x}}{2}$       (2)  $y' = \frac{3}{4\sqrt[4]{x}}$       (3)  $y' = -\frac{1}{3x\sqrt[3]{x}}$       (4)  $y' = -\frac{1}{x\sqrt[5]{x}}$   
 (5)  $y' = -\frac{3}{4x\sqrt[4]{x^3}}$       (6)  $y' = -\frac{2}{3x\sqrt[3]{x^2}}$       (7)  $y' = -\frac{2}{3\sqrt[3]{(1-2x)^2}}$   
 (8)  $y' = \frac{2x^2}{\sqrt[3]{(2x^3+1)^2}}$       (9)  $y' = \frac{2x+1}{4\sqrt[4]{(x^2+x+1)^3}}$       (10)  $y' = \frac{10}{3\sqrt[3]{5x+2}}$

$$(11) y' = \frac{3x}{2(5-3x^2)\sqrt[4]{5-3x^2}} \quad (12) y' = -\frac{2x}{5(x^2+3)\sqrt[5]{x^2+3}}$$

問 14. (1)  $\frac{1}{3\sqrt[3]{x^2}}$       (2)  $\frac{1}{4\sqrt[4]{x^3}}$

問 15. (1) 3      (2) 2      (3) -2

問 16. (1)  $y' = \frac{2x}{x^2+1}$       (2)  $y' = \frac{3}{(3x+1)\log 2}$       (3)  $y' = x(2\log x + 1)$

(4)  $y' = \frac{2\log x}{x}$       (5)  $y' = \frac{1-\log x}{x^2}$       (6)  $y' = \frac{(x+1)(x-1)}{x(x^2+1)}$

問 17. (1)  $y' = \frac{3}{3x-1}$       (2)  $y' = \frac{2x-1}{x^2-x}$

(3)  $y' = \frac{1}{x \log 10}$       (4)  $y' = \frac{2}{(x-1)(x+1)}$

問 18. (1)  $y' = \frac{x+2}{\sqrt{(x+1)(x+3)}}$       (2)  $y' = \frac{(x+1)(x-2)^2}{(x-1)^3}$

(3)  $y' = \frac{2}{3\sqrt[3]{(x-1)^2(x+1)^4}}$       (4)  $y' = 2^x \log 2$

(5)  $y' = x^x(\log x + 1)$

問 19. (1)  $y' = 2x e^{x^2}$       (2)  $y' = -3^{-x} \log 3$       (3)  $y' = 3e^{3x+1}$       (4)  $(2x-1)e^{2x}$

(5)  $y' = (\log x + \frac{1}{x})e^x$       (6)  $2x(1-x)e^{-2x}$       (7)  $y' = \frac{e^x}{(e^x+1)^2}$

(8)  $y' = \frac{(x-1)e^x}{x^2}$       (9)  $y' = 2a^{2x+1} \log a$       (10)  $y' = (3x \log a + 1)a^{3x}$

問 20. (1)  $y'' = 20x^3 - 18x$       (2)  $y'' = 12x^2 - \frac{1}{4\sqrt{x^3}}$       (3)  $y'' = 2\log x + 3$

(4)  $y'' = (x^2 - 4x + 2)e^{-x}$       (5)  $y'' = 2(2x^2 + 1)e^{x^2}$       (6)  $y'' = \frac{1}{x^3}$

問 21. (1)  $y''' = e^x$       (2)  $y''' = -\frac{3}{8\sqrt{x^3}}$

問 22. (1)  $y^{(n)} = 2^n e^{2x}$       (2)  $y^{(n)} = (x+n)e^x$

(3)  $y^{(n)} = \frac{(-1)^n n!}{(x-1)^{n+1}}$

- 問 23. (1) 接線 :  $y = \frac{3}{2}x + \frac{3}{2}$ , 法線 :  $y = -\frac{2}{3}x + \frac{11}{3}$   
 (2) 接線 :  $y = -2x + 6$ , 法線 :  $y = \frac{1}{2}x + 1$   
 (3) 接線 :  $y = ex$ , 法線 :  $y = -\frac{1}{e}x + e + \frac{1}{e}$   
 (4) 接線 :  $y = x - 1$ , 法線 :  $y = -x + 1$

問 24.

(1)

$x$	...	1	...	2	...	3	...
$f'(x)$	+	0	-	↘	-	0	+
$f(x)$	↗	極大 2	↘	↘	↘	極小 6	↗

$x = 1$  で極大値 2,  $x = 3$  で極小値 6 をとる.

(2)

$x$	0	...	$1/e$	...
$f'(x)$	↘	-	0	+
$f(x)$	↘	↘	極小 $-1/e$	↗

$x = \frac{1}{e}$  で極小値  $-\frac{1}{e}$  をとる.

(3)

$x$	...	0	...	1	...
$f'(x)$	-	0	+	0	-
$f(x)$	↘	極小 0	↗	極大 $1/e^2$	↘

$x = 0$  で極小値 0,  $x = 1$  で極大値  $\frac{1}{e^2}$  をとる.

(4)

$x$	0	...	4	...
$f'(x)$	↘	-	0	+
$f(x)$	0	↘	極小 -4	↗

$x = 4$  で極小値 -4 をとる.

問 25.

(1)

$x$	...	0	...	2	...	3	...
$f'(x)$	+	0	+	+	+	0	-
$f''(x)$	-	0	+	0	-	-	-
$f(x)$	↗	変曲点 0	↗	変曲点 4	↗	極大 $27/4$	↘

$x = 3$  で極大値  $\frac{27}{4}$  をとる. 変曲点は  $(0, 0)$ ,  $(2, 4)$ .

$x$	...	1	...	2	...
$f'(x)$	+	0	-	-	-
(2) $f''(x)$	-	-	-	0	+
$f(x)$	↗	極大 $1/e$	↘	変曲点 $2/e^2$	↘

$x = 1$  で極大値  $\frac{1}{e}$  をとる。変曲点は  $(2, \frac{2}{e^2})$ 。

$x$	...	0	...	2	...	4	...
$f'(x)$	+	0	-	/	-	0	+
(3) $f''(x)$	-	-	-	/	+	+	+
$f(x)$	↗	極大 0	↘	/	↘	極小 8	↗

$x = 0$  で極大値 0,  $x = 4$  で極小値 8 をとる。変曲点はなし。

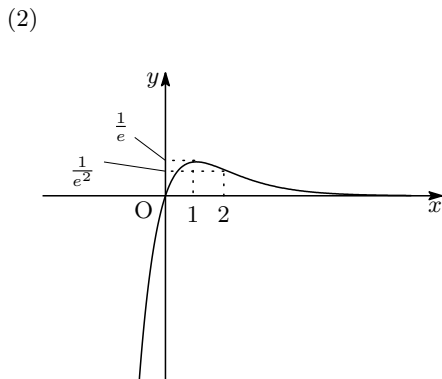
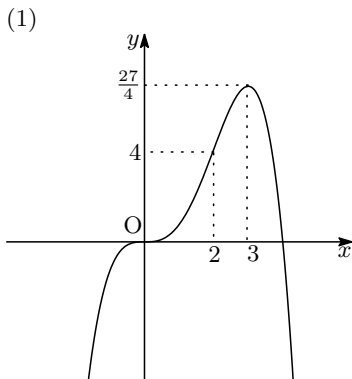
直線  $x = 2$  はこの曲線の漸近線である。

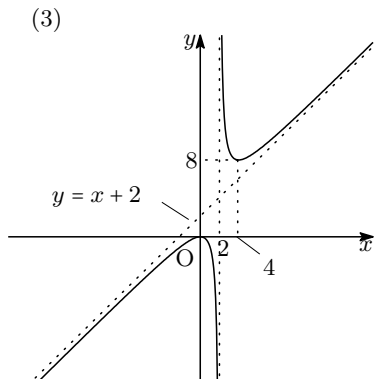
$$\lim_{x \rightarrow \infty} \{y - (x + 2)\} = \lim_{x \rightarrow \infty} \frac{4}{x - 2} = 0,$$

$$\lim_{x \rightarrow -\infty} \{y - (x + 2)\} = \lim_{x \rightarrow -\infty} \frac{4}{x - 2} = 0$$

より,  $y = x + 2$  も漸近線である。

(1)~(3) のグラフの概形は以下のとおり。





問 26. (1) 2 (2) 0 (3) 1

#### 4 章

問 1. (1)  $f_x = 3x^2 - 8xy + y$ ,  $f_y = -4x^2 + x + 6y$ ;  $f_x(2, 1) = -3$ ,  $f_y(2, 1) = -8$

(2)  $f_x = -\frac{y}{x^2}$ ,  $f_y = \frac{1}{x}$ ;  $f_x(2, 1) = -\frac{1}{4}$ ,  $f_y(2, 1) = \frac{1}{2}$

(3)  $f_x = \frac{2y}{(x+y)^2}$ ,  $f_y = -\frac{2x}{(x+y)^2}$ ;  $f_x(2, 1) = \frac{2}{9}$ ,  $f_y(2, 1) = -\frac{4}{9}$

(4)  $f_x = \frac{-x^2 + y^2}{(x^2 + y^2)^2}$ ,  $f_y = -\frac{2xy}{(x^2 + y^2)^2}$ ;  $f_x(2, 1) = -\frac{3}{25}$ ,  $f_y(2, 1) = -\frac{4}{25}$

(5)  $f_x = \frac{1}{\sqrt{2x+3y}}$ ,  $f_y = \frac{3}{2\sqrt{2x+3y}}$ ;  $f_x(2, 1) = \frac{1}{\sqrt{7}}$ ,  $f_y(2, 1) = \frac{3}{2\sqrt{7}}$

(6)  $f_x = \frac{x}{\sqrt{x^2-2y^2}}$ ,  $f_y = -\frac{2y}{\sqrt{x^2-2y^2}}$ ;  $f_x(2, 1) = \sqrt{2}$ ,  $f_y(2, 1) = -\sqrt{2}$

(7)  $f_x = 3x^2 e^y$ ,  $f_y = x^3 e^y$ ;  $f_x(2, 1) = 12e$ ,  $f_y(2, 1) = 8e$

(8)  $f_x = e^{x+2y}$ ,  $f_y = 2e^{x+2y}$ ;  $f_x(2, 1) = e^4$ ,  $f_y(2, 1) = 2e^4$

(9)  $f_x = \frac{1}{x+2y}$ ,  $f_y = \frac{2}{x+2y}$ ;  $f_x(2, 1) = \frac{1}{4}$ ,  $f_y(2, 1) = \frac{1}{2}$

(10)  $f_x = \frac{2x}{x^2 + y^2}$ ,  $f_y = \frac{2y}{x^2 + y^2}$ ;  $f_x(2, 1) = \frac{4}{5}$ ,  $f_y(2, 1) = \frac{2}{5}$

- 問 2. (1)  $f_{xx} = 6xy^2$ ,  $f_{xy} = f_{yx} = 6x^2y$ ,  $f_{yy} = 2x^3$   
 (2)  $f_{xx} = 48(2x + 3y)^2$ ,  $f_{xy} = f_{yx} = 72(2x + 3y)^2$ ,  $f_{yy} = 108(2x + 3y)^2$   
 (3)  $f_{xx} = y^2 e^{xy}$ ,  $f_{xy} = f_{yx} = (xy + 1)e^{xy}$ ,  $f_{yy} = x^2 e^{xy}$   
 (4)  $f_{xx} = -\frac{1}{(x + 2y)^2}$ ,  $f_{xy} = f_{yx} = -\frac{2}{(x + 2y)^2}$ ,  $f_{yy} = -\frac{4}{(x + 2y)^2}$   
 (5)  $f_{xx} = -\frac{2}{x^2}$ ,  $f_{xy} = f_{yx} = 0$ ,  $f_{yy} = -\frac{1}{y^2}$   
 (6)  $f_{xx} = \frac{2y}{(x + y)^3}$ ,  $f_{xy} = f_{yx} = \frac{-x + y}{(x + y)^3}$ ,  $f_{yy} = -\frac{2x}{(x + y)^3}$
- 問 3. (1)  $\frac{dz}{dt} = 2(t - e^{2t})$       (2)  $\frac{dz}{dt} = -\frac{3}{t^4} + 6t^5$
- 問 4. (1)  $\frac{\partial z}{\partial u} = \frac{18u}{9u^2 + 4v^2}$ ,  $\frac{\partial z}{\partial v} = \frac{8v}{9u^2 + 4v^2}$   
 (2)  $\frac{\partial z}{\partial u} = v(2u - v)e^{uv(u-v)}$ ,  $\frac{\partial z}{\partial v} = u(u - 2v)e^{uv(u-v)}$
- 問 5. (1)  $dz = xy^2(3x + 2y)dx + x^2y(2x + 3y)dy$   
 (2)  $dz = 2e^{x^2+y^2}(x dx + y dy)$   
 (3)  $dz = \frac{1}{2\sqrt{x+y}}(dx + dy)$   
 (4)  $dz = \frac{1}{x^2 + y^2}(x dx + y dy)$
- 問 6. (1)  $(2, 1)$  で極小値  $-3$   
 (2)  $\left(\frac{2}{3}, 0\right)$  で極小値  $-\frac{4}{27}$   
 (3)  $(2, 1)$  で極小値  $-18$ ,  $(-2, -1)$  で極大値  $18$   
 (4)  $(1, 1)$ ,  $(-1, -1)$  で極小値  $-1$   
 (5)  $(2, 2)$  で極小値  $2$   
 (6)  $\left(0, -\frac{1}{2}\right)$  で極小値  $-1$
- 問 7. (1)  $\frac{dy}{dx} = \frac{x^2 - y}{x - y^2}$       (2)  $\frac{dy}{dx} = \frac{2x - y}{x - 2y}$

$$(3) \frac{dy}{dx} = -\frac{\sqrt{y}}{\sqrt{x}} \quad (4) \frac{dy}{dx} = -\frac{e^x - 1}{e^y - 1}$$

問 8. (1) 接線 :  $\sqrt{2}x + y - 2 = 0$ , 法線 :  $\sqrt{2}x - 2y + 1 = 0$

(2) 接線 :  $4x - 5y + 19 = 0$ , 法線 :  $5x + 4y - 48 = 0$

(3) 接線 :  $x - 4y + 14 = 0$ , 法線 :  $4x + y - 29 = 0$

問 9. (1)  $x = 1$  で極大値  $y = 1$ ,  $x = 3$  で極小値  $y = 5$

(2)  $x = 1$  で極小値  $y = -1$ ,  $x = -1$  で極大値  $y = 1$

(3)  $x = 2$  で極大値  $y = 2$

(4)  $x = 1$  で極小値  $y = 2$

問 10. (1)  $(-1, 1)$  で極大値 2,  $(1, -1)$  で極小値 -2

(2)  $(\pm\sqrt{2}, \pm\frac{1}{\sqrt{2}})$  で極大値 1,  $(\pm\sqrt{2}, \mp\frac{1}{\sqrt{2}})$  で極小値 -1 (複号同順)

(3)  $(\frac{2}{\sqrt{5}}, \frac{4}{\sqrt{5}})$  で極大値  $2\sqrt{5}$ ,  $(-\frac{2}{\sqrt{5}}, -\frac{4}{\sqrt{5}})$  で極小値  $-2\sqrt{5}$

(4)  $(\pm\frac{1}{\sqrt{2}}, \pm\frac{1}{\sqrt{2}})$  で極大値  $\frac{3}{2}$ ,  $(\pm\frac{1}{\sqrt{2}}, \mp\frac{1}{\sqrt{2}})$  で極小値  $\frac{1}{2}$  (複号同順)

問 11. (1)  $(1, 1)$ ,  $(-1, -1)$  (2)  $(1, 1)$ ,  $(-1, -1)$

## 5 章

問 1. (1)  $\frac{3}{8}$  (2)  $\frac{1}{6}$

問 2.  $\frac{33}{100}$

問 3.  $P(B|A) = \frac{1}{3}$ ,  $P(A|B) = \frac{1}{6}$

問 4.  $\frac{49}{82}$

問 5. (1)  $\frac{3}{100}$  (2)  $\frac{4}{15}$

問 6.  $\frac{5}{324}$

問 7. (1) 

$x$	1	2	3
$p(x)$	$\frac{3}{10}$	$\frac{6}{10}$	$\frac{1}{10}$
$F(x)$	$\frac{3}{10}$	$\frac{9}{10}$	1

 (2)  $\frac{7}{10}$

問 8. 130 円

問 9. (1)  $-\frac{7}{2}$  (2) 90

問 10. (1)  $V(X+2) = \frac{35}{12}$ ,  $\sigma(X+2) = \frac{\sqrt{105}}{6}$   
 (2)  $V(-6X+5) = 105$ ,  $\sigma(-6X+5) = \sqrt{105}$

問 11.  $E(X+Y) = 2.2$ ,  $V(X+Y) = 0.76$