

$l_2 \perp l_1$

$y =$

$C(s,t)$

$B(0,t)$ ,  $x =$   $l_1$

$m_{AB} \cdot m_{l_2} = -1$  :  $AB$   $l_2$

$m_{l_2} = \frac{t-0}{s-0} = \frac{t}{s}$ ,  $m_{AB} = \frac{t-0}{0-20} = -\frac{t}{20}$

$m_{AB} \cdot m_{l_2} = -1$

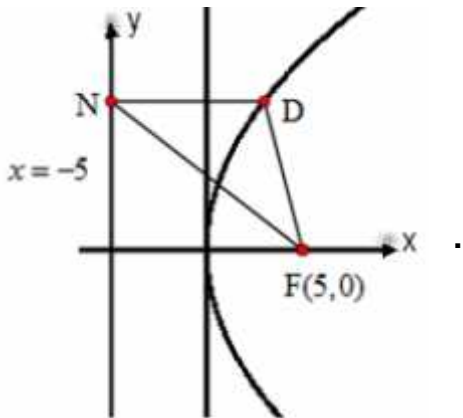
$-\frac{t}{20} \cdot \frac{t}{s} = -1$

$t^2 = 20s \rightarrow \boxed{y^2 = 20x}$

$F(5,0)$ ,  $p = 10$ ,  $y^2 = 20x$

:

(1)



$x = -5$   $k = -5$

$DN = DF$ ,  $DNF$

$k = -5$ :

$DNF$   $D$  (2)

$DN = NF$

$DN = \frac{a^2}{20} - (-5) = \frac{a^2 + 100}{20}$ ,  $D(\frac{a^2}{20}, a)$ :

$DN = NF$

$\frac{a^2 + 100}{20} = \sqrt{(a-0)^2 + (-5-5)^2}$

$\frac{(a^2 + 100)^2}{400} = a^2 + 100 \quad /: (a^2 + 100) > 0$

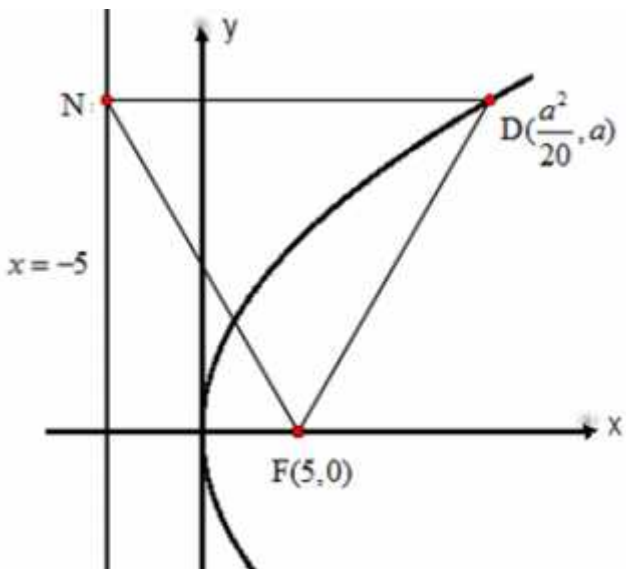
$\frac{a^2 + 100}{400} = 1$

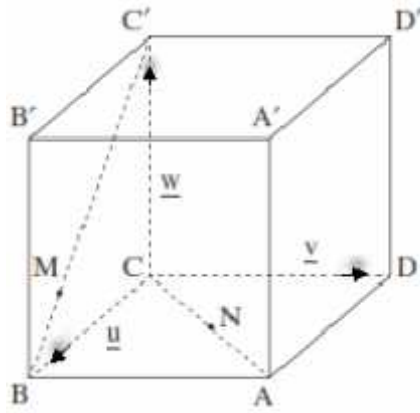
$a^2 = 300$

$x_D = \frac{300}{20} = 15$ ,  $y_D = \sqrt{300} = 10\sqrt{3} \rightarrow \boxed{D(15, 10\sqrt{3})}$

$D(15, 10\sqrt{3})$ :

"





. AA'B'B

MN

, B

$$\cdot \underline{w} = \underline{v} ,$$

, ABCDA'B'C'D' .

$$\boxed{\overline{CB} = \underline{u}} \quad \boxed{|\underline{u}| = a} \quad \boxed{\underline{u}^2 = a^2}$$

$$\boxed{\overline{CD} = \underline{v}} \quad \boxed{|\underline{v}| = a} \quad \boxed{\underline{v}^2 = a^2}$$

$$\boxed{\overline{CC'} = \underline{w}} \quad \boxed{|\underline{w}| = a} \quad \boxed{\underline{w}^2 = a^2}$$

$$\underline{u} \cdot \underline{v} = 0 \quad , \quad \underline{u} \cdot \underline{w} = 0 \quad , \quad \underline{v} \cdot \underline{w} = 0$$

$$\overline{AN} = s \overline{AC}$$

$$\overline{AN} = s(\overline{AB} + \overline{BC})$$

$$\boxed{\overline{AN} = -s\underline{u} - s\underline{v}}$$

$$\overline{BM} = t \overline{BC'}$$

$$\overline{BM} = t(\overline{BB'} + \overline{B'C'})$$

$$\boxed{\overline{BM} = -t\underline{u} + t\underline{w}}$$

$$\overline{MN} = \overline{MB} + \overline{BA} + \overline{AN}$$

$$\overline{MN} = t\underline{u} - t\underline{w} + \underline{v} - s\underline{u} - s\underline{v}$$

$$\boxed{\overline{MN} = (t-s)\underline{u} + (1-s)\underline{v} - t\underline{w}}$$

M

, t ≠ 0 -

, AA'B'B

MN

$\overline{MN}$

$$\cdot \frac{s}{t} = 1 - t = s -$$

$$, t - s = 0$$

$$\cdot \frac{s}{t} = 1 :$$

$$\vec{MN} = -\frac{1}{4}\underline{u} + \frac{1}{2}\underline{v} - \frac{1}{4}\underline{w} \quad t = \frac{1}{4}, s = \frac{1}{2}$$

$\underline{u} = (a, 0, 0)$  ,  $\underline{v} = (0, a, 0)$  ,  $\underline{w} = (0, 0, a)$  :  $a$  -

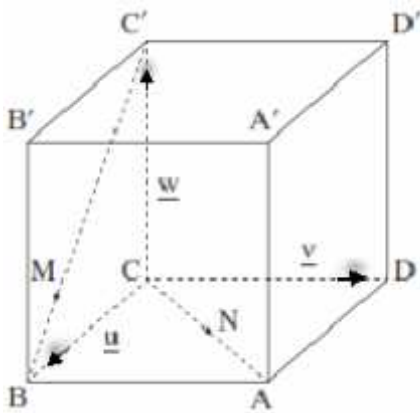
$( \quad - ) N(\frac{a}{2}, \frac{a}{2}, 0)$  ,  $C'(0, 0, a)$  ,  $B(a, 0, 0)$  ,  $A(a, a, 0)$  ,  $C(0, 0, 0)$  -

$( \quad - ) M(\frac{3a}{4}, 0, \frac{a}{4})$  -

$z=0$  ,  $y$   $x$  , ABCD

$$\vec{MN} = \underline{x} = (-\frac{1}{4}a, \frac{1}{2}a, -\frac{1}{4}a)$$

$$\ell_{MN} = \underline{x} = (\frac{3a}{4}, 0, \frac{a}{4}) + r(1, -2, 1) : MN$$



$\cdot$  ABCD  $\quad$  MN

$$\sin r = \frac{|(1, -2, 1) \cdot (0, 0, 1)|}{\sqrt{1^2 + (-2)^2 + 1^2} \cdot \sqrt{0^2 + 0^2 + 1^2}} = \frac{1}{\sqrt{6}} = \frac{\sqrt{6}}{6}$$

$$r = 24.09^\circ$$

$\cdot$   $24.09^\circ$  ABCD MN :

$y$  - , AB

$$\ell_{AB} = \underline{x} = (a, a, 0) + q(0, 1, 0)$$

$$\ell_{MN} = \underline{x} = (\frac{3a}{4}, 0, \frac{a}{4}) + r(1, -2, 1) \quad MN$$

$$(1) \quad \frac{3a}{4} + r = a \rightarrow a = 4r$$

$$(2) \quad -2r = a + q$$

$$(3) \quad \frac{a}{4} + r = 0 \rightarrow a = -4r$$

$$a = 0 \quad r = 0 \quad \text{(3) - (1)}$$

$$z = 0$$

$$\frac{-}{N - B, A}$$

M

$$MN - AB, \quad .$$

$$(. \quad - \quad , \quad )$$

:

.A , (  $a > 0$  ) ,  $z_1 = a - \sqrt{3} \cdot a \cdot i$  :

$$\tan \{ \theta_A = \frac{-a\sqrt{3}}{a} = -\sqrt{3}$$

$$\{ \theta_A = -60^\circ + 180^\circ k$$

$\{ \theta_A = -60^\circ$  4th quadrant

$$r = \sqrt{a^2 + (-a\sqrt{3})^2} = \sqrt{4a^2} = 2a$$

$$\boxed{z_1 = 2a \operatorname{cis}(-60^\circ)}$$

.120° - "

, ,  $\Delta ABC$  -

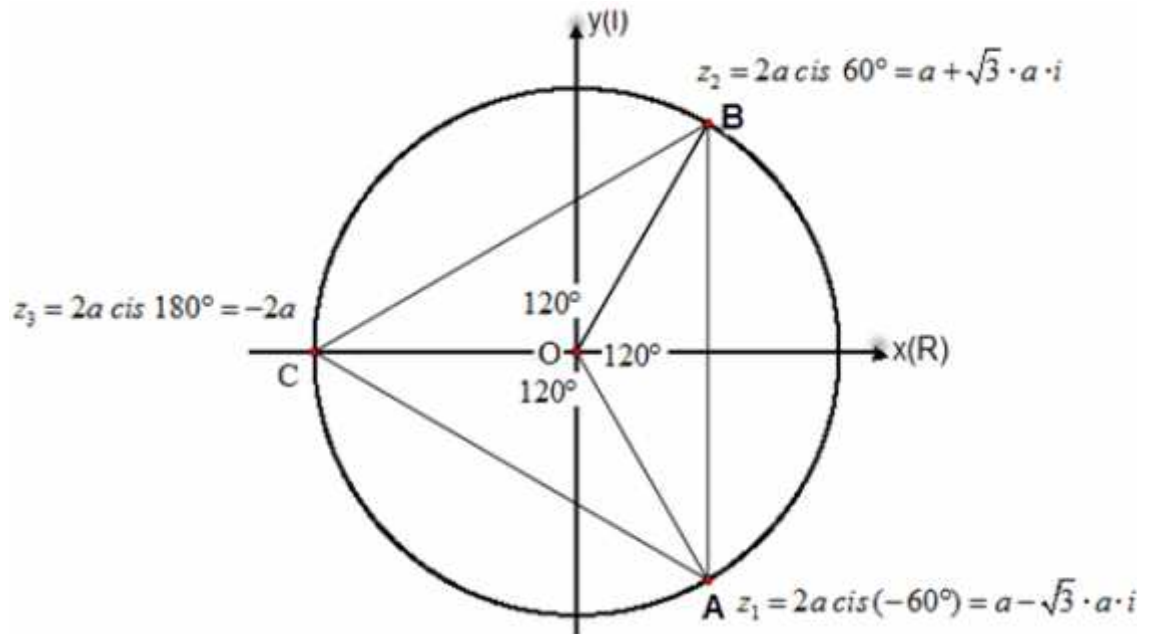
$$\sphericalangle AOB = 120^\circ$$

$$\{ \theta_B = -60^\circ + 120^\circ = 60^\circ \rightarrow \boxed{z_2 = 2a \operatorname{cis} 60^\circ = a + \sqrt{3} \cdot a \cdot i}$$

$$\sphericalangle BOC = 120^\circ$$

$$\{ \theta_C = 60^\circ + 120^\circ = 180^\circ \rightarrow \boxed{z_3 = 2a \operatorname{cis} 180^\circ = -2a}$$

.  $z_3 = 2a \operatorname{cis} 180^\circ = -2a$  ,  $z_2 = 2a \operatorname{cis} 60^\circ = a + \sqrt{3} \cdot a \cdot i$  :



$$z_3 = \frac{z_1^3}{4} \quad ;$$

$$2a \operatorname{cis} 180^\circ = \frac{(2a \operatorname{cis}(-60^\circ))^3}{4}$$

$$-8a = 8a^3 \operatorname{cis}(-60^\circ \cdot 3) \quad / : 8a > 0$$

$$-1 = a^2 \operatorname{cis} 180^\circ$$

$$-1 = -a^2$$

$$a^2 = 1$$

$$\boxed{a=1} \quad \leftarrow a > 0$$

$$a = 1 \quad ;$$

P  $z_1^{6n+5} \quad ;$

, OP  $z_2 = 2a \operatorname{cis} 60^\circ \quad , B$

$$z_1^{6n+5}$$

$$z_1^{6n+5} = (2a \operatorname{cis}(-60^\circ))^{6n+5}$$

$$z_1^{6n+5} = (2a)^{6n+5} \operatorname{cis}(-60^\circ)^{6n} \cdot \operatorname{cis}(-60^\circ)^5$$

$$z_1^{6n+5} = (2a)^{6n+5} \operatorname{cis}(-60^\circ \cdot 6)^n \cdot \operatorname{cis}(-60^\circ \cdot 5)$$

$$z_1^{6n+5} = (2a)^{6n+5} \operatorname{cis}(-360^\circ)^n \cdot \operatorname{cis}(-300^\circ)$$

$$\boxed{z_1^{6n+5} = (2a)^{6n+5} \operatorname{cis}(60^\circ)}$$

$$; \quad ;$$

$$f(x) = e^{g(x)} = e^{2x^2+c}$$

(

$$g(x) = 2x^2 + c$$

.

$$g'(2) = f'(2) :$$

$$f'(x) = 4xe^{2x^2+c} \quad g'(x) = 4x$$

$$g'(2) = f'(2)$$

$$4 \cdot 2 = 4 \cdot 2e^{2 \cdot 2^2+c} \quad /:8$$

$$1 = e^{8+c}$$

$$8+c=0$$

$$\boxed{c = -8}$$

$$c = -8 :$$

$$f(x) = e^{g(x)} = e^{2x^2-8}, \quad g(x) = 2x^2 - 8 .$$

$$f'(x) \quad (1)$$

$$f'(x) = 4xe^{2x^2-8}$$

$$f'(-x) = 4(-x)e^{2(-x)^2-8}$$

$$f'(-x) = -4xe^{2x^2-8}$$

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

$$(f(x) \quad ) .$$

,

:

$$g'(x) = f'(x) \quad (2)$$

$$4xe^{2x^2-8} = 4x \quad /:4$$

$$xe^{2x^2-8} - x = 0$$

$$x(e^{2x^2-8} - 1) = 0$$

$$x=0 \rightarrow g'(0) = 4 \cdot 0 = 0 \rightarrow \boxed{(0, 0)}$$

$$e^{2x^2-8} = 1$$

$$2x^2 - 8 = 0$$

$$x=2 \rightarrow g'(2) = 4 \cdot 2 = 8 \rightarrow \boxed{(2, 8)}$$

$$x=-2 \rightarrow g'(-2) = 4 \cdot (-2) = -8 \rightarrow \boxed{(-2, -8)}$$

$$f'(x) \quad -$$

$$(-2, -8) \quad -$$

$$(-2, -8), (2, 8), (0, 0) :$$

"

$$f'(x) > g'(x) \quad x \quad (3)$$

$$f'(x) = 4xe^{2x^2-8} \quad g'(x) = 4x$$

$$f'(-3) = 4 \cdot (-3) \cdot e^{2(-3)^2-8} = -264317 \quad g'(-3) = 4 \cdot (-3) = -12 \rightarrow f'(x) < g'(x)$$

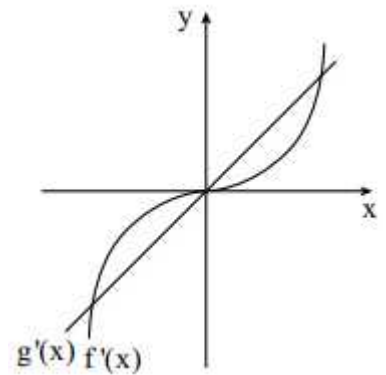
$$f'(-1) = -9.9 \cdot 10^{-3} \quad g'(-1) = -4 \rightarrow f'(x) > g'(x)$$

$$f'(1) = -9.9 \cdot 10^{-3} \quad g'(1) = 4 \rightarrow f'(x) < g'(x)$$

$$f'(3) = 264317 \quad g'(3) = 12 \rightarrow f'(x) > g'(x)$$

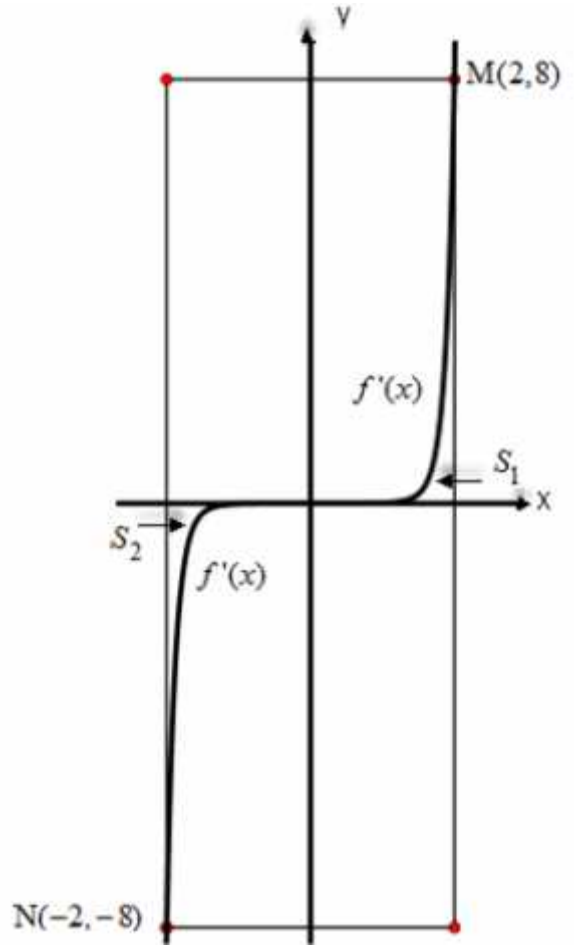
$$-2 < x < 0 \quad , \quad x > 2 :$$

(4)





$f'(x)$  - ,  $M(2,8)$ ,  $N(-2,-8)$  .



.( " 16)

,(-2 - 2) -2 - 0 ,0 - 2

,  $S_1 = S_2$  - ,  $f'(x)$

.  $x$  -

,  $(S_1)$

,

,  $f'(x)$  -

-  $(S_2)$

.  $f'(x)$  -

$f'(x)$

. :

$$f(x) = x + m \cdot \ln\left(\frac{1}{x}\right)$$

$$f(x) = x + m \cdot (\ln(1) - \ln(x))$$

$$f(x) = x + m \cdot (0 - \ln(x))$$

$$f(x) = x - m \ln x$$

$$x > 0$$

$$f(x) = x - m \ln x$$

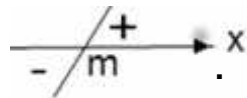
$$m \tag{1}$$

$$f'(x) = 1 - \frac{m}{x}$$

$$f'(x) = \frac{x - m}{x}$$

$$x - m = 0$$

$$x = m$$



$$m > 0$$

$$x = m$$

$$m > 0$$

$$(m, m - m \ln m) \tag{2}$$

$$(m, m - m \ln m)$$

$$m$$

$$f(x) = x - m \ln x$$

P

$$x_p = 1 \quad \ln x = 0$$

y

m

$$\tag{1}$$

$$P(1, 1)$$

$$m = 1 \quad (m, m - m \ln m)$$

$$\tag{2}$$

$$\tag{2}$$

$$m = 1$$

$$f(x) = x - \ln x$$

$$x = 0, +\infty$$

$$, 13.8$$

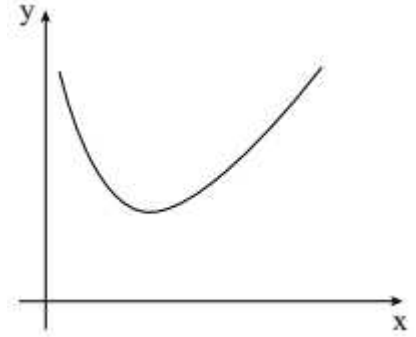
$$x = 0.000001$$

$$, +\infty$$

$$, 999986$$

$$x = 1000000$$

:



$$g(x) = \frac{f(x) - x}{x}$$

$$g(x) = \frac{x - \ln x - x}{x}$$

$$g(x) = -\frac{\ln x}{x}$$

$$\int_1^e g(x) dx = \int_1^e -\frac{\ln x}{x} dx = \int_1^e (-\ln x \cdot \frac{1}{x}) dx =$$

$$= -\left[ \frac{(\ln x)^2}{2} \right]_1^e = -\frac{(\ln e)^2}{2} - \left( -\frac{(\ln 1)^2}{2} \right) = -\frac{1}{2} - 0 = -\frac{1}{2}$$

$$-\frac{1}{2}$$