

.4 (0,0)

: AB M(s,t)

$$\frac{0 + x_B}{2} = s \rightarrow x_B = 2s \rightarrow \boxed{B(2s, 0)}$$

$$\frac{y_A + 0}{2} = t \rightarrow y_A = 2t \rightarrow \boxed{A(0, 2t)}$$

: (ΔAOB " ) , AB = 4

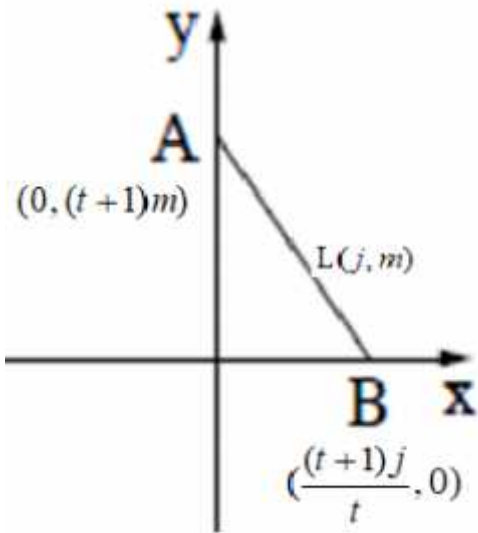
$$\cdot |2s|^2 + |2t|^2 = 4^2 \rightarrow 4s^2 + 4t^2 = 16 \rightarrow s^2 + t^2 = 16$$

$$\cdot x^2 + y^2 = 16$$

$$\cdot x^2 + y^2 = 16$$

, L(j, m)

: ,  $\frac{AL}{LB} = \frac{t}{1}$  AB L(j, m)



$$\frac{0 + t x_B}{t+1} = j \rightarrow x_B = \frac{(t+1)j}{t} \rightarrow \boxed{B\left(\frac{(t+1)j}{t}, 0\right)}$$

$$\frac{y_A + 0}{t+1} = m \rightarrow y_A = (t+1)m \rightarrow \boxed{A(0, (t+1)m)}$$

: (ΔAOB " ) , AB = 4

$$\left| \frac{(t+1)j}{t} \right|^2 + |(t+1)m|^2 = 4^2$$

$$\cdot \frac{(t+1)^2}{t^2} j^2 + (t+1)^2 m^2 = 16$$

$$\frac{(t+1)^2}{16t^2} j^2 + \frac{(t+1)^2}{16} m^2 = 1$$

$$\cdot \frac{(t+1)^2}{16t^2} x^2 + \frac{(t+1)^2}{16} y^2 = 1$$

$$\cdot b = \frac{4}{t+1} \cdot a = \frac{4t}{t+1}$$

$$\cdot \frac{(t+1)^2}{16t^2} x^2 + \frac{(t+1)^2}{16} y^2 = 1$$

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.  $t=1$  , AB

L(j, m)

-  $a=b$

.  $b = \frac{4}{t+1}$  -  $a = \frac{4t}{t+1}$

$\frac{4t}{t+1} = \frac{4}{t+1}$

$4t = 4$

$t = 1$

$\frac{(1+1)^2}{16 \cdot 1^2} x^2 + \frac{(1+1)^2}{16} y^2 = 1$

$\frac{x^2}{4} + \frac{y^2}{4} = 1$

$x^2 + y^2 = 4$

.  $t = 1$  :

.  $a = \frac{4t}{t+1}$  ,  $\frac{(t+1)^2}{16t^2} x^2 + \frac{(t+1)^2}{16} y^2 = 1$

.  $(\frac{4t}{t+1}, 0)$  , x -

. (5, 0)

$\frac{4t}{t+1} = 5$

.  $4t = 5t + 5$

~~$t > -5$~~   $\leftarrow t > 0$

. (5, 0)

x -

,  $t > 0$

:

$z = 0$  ,  $[x, y]$  , ABCD OBCDE .  
 $z = 6$  , B  
 $6$  ,  
 $D(6, 6, 0)$  ,  $C(0, 6, 0)$  ,  $B(0, 0, 0)$  ,  $A(6, 0, 0)$   
 $D'(6, 6, 0)$  ,  $C'(0, 6, 0)$  ,  $B'(0, 0, 0)$  ,  $A'(6, 0, 0)$   
 $BC'$   $A'C$   
 $\vec{A'C} = \underline{C} - \underline{A'} = \underline{x} = (-6, 6, -6)$   
 $\vec{BC'} = \underline{C} - \underline{B} = \underline{x} = (0, 6, 6)$   
 $\cos \gamma = \frac{|(-1, 1, -1) \cdot (0, 1, 1)|}{\sqrt{(-1)^2 + 1^2 + (-1)^2} \cdot \sqrt{0^2 + 1^2 + 1^2}} = \frac{0}{\sqrt{6}} \rightarrow \gamma = 90^\circ$   
 $90^\circ$   $BC'$   $A'C$  :  
 $( \quad ) BD \perp AC$  .  
 $( \quad ) BD \perp A'C$   
 $(AC'$  ,  $AC'$   $AC$   $BD$  :  
 $( \quad ) B'D \perp A'C$   
 $( \quad ) f_{BC'D}$   $A'C$   
 $BC'D$   $A'C$  :

$$\cdot BC'D \quad A'C \quad K \quad \cdot$$

$$\cdot (d=0, \quad ) BC'D$$

$$\cdot A'C$$

$$\cdot (a,b,c) = (1,-1,1) \quad \overline{A'C} = \underline{x} = (-6,6,-6)$$

$$\cdot f_{BC'D} : x - y + z = 0 \quad , \quad ,$$

$$\cdot (6+t, -t, 6+t) \quad \ell_{\overline{A'C}} = \underline{x} = (6,0,6) + t(1,-1,1)$$

$$6+t+t+6+t=0 \rightarrow t=-4 \rightarrow K(2,4,2) :$$

$$\cdot \frac{A'K}{A'C} = \frac{2}{3} \quad , \quad 2:1 \quad A'C \quad K \quad , \quad \frac{x_{A'} - x_K}{x_K - x_C} = \frac{6-2}{2-0} = \frac{2}{1} \quad K -$$

$$\cdot \frac{A'K}{A'C} = \frac{2}{3} \quad , \quad \overline{A'K} = \frac{2}{3} \overline{A'C} \quad , \quad \overline{A'K} = \underline{K} - \underline{A'} = \underline{x} = (-4,4,-4)$$

$$\cdot \frac{A'K}{A'C} = \frac{2}{3} :$$

$$\cdot BD \quad AC \quad O \quad \cdot$$

$$\cdot O(3,3,0) \quad ,$$

$$\cdot \overline{C'K} = \underline{K} - \underline{C'} = \underline{x} = (2,-2,-4) \quad , \quad \overline{C'O} = \underline{O} - \underline{C'} = \underline{x} = (3,-3,-6)$$

$$\cdot C'O \quad K \quad , \quad \frac{C'K}{C'O} = \frac{2}{3} \quad , \quad \overline{A'K} = \frac{2}{3} \overline{A'C}$$

$$\cdot C'O \quad K \quad :$$

$$\bar{z} = x - yi, \quad (z = x + yi) \quad (1)$$

$$z\bar{z} = |z|^2$$

$$z\bar{z} = |z|^2$$

$$\Leftrightarrow (x + yi)(x - yi) = \sqrt{x^2 + y^2}^2$$

$$\Leftrightarrow x^2 + y^2 = x^2 + y^2 \quad o.k.$$

$$x^2 + y^2 = 1, \quad |z| = 1, \quad z \quad (2)$$

$$\frac{1}{z} = \frac{1}{x + yi} = \frac{1}{x + yi} \cdot \frac{x - yi}{x - yi} = \frac{x - yi}{x^2 + y^2} = \frac{x - yi}{1} = x - yi$$

$$\left| \frac{1}{z} \right| = |x - yi| = \sqrt{x^2 + y^2} = 1$$

$$\frac{1}{z} = x - yi \quad (2) \quad z \quad (1)$$

$$z + \frac{1}{z}$$

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

$$x - \frac{1}{z}$$

$$z_2 - z_1 \quad (2)$$

$$z_2 - z_1 \quad z_1 + \frac{1}{z_1} + z_2 + \frac{1}{z_2} > 2$$

$$z_2 + \frac{1}{z_2} = 2a \quad z_1 + \frac{1}{z_1} = 2x \quad (1) \quad z_2 = a + bi, \quad z_1 = x + yi :$$

$$x + a > 1 \quad 2x + 2a > 2$$

$$-1 < x, a < 1$$

$$0 < x, a < 1 \quad x + a > 1, \quad x + a > 1$$

$$\text{III, I} \quad z_2 - z_1 \quad 0 < x, a < 1 :$$

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$$\cdot ( \quad ) \quad 0 < r < \frac{f}{2} \quad . \quad w = 1 \text{ cis } \theta \quad .$$

$$\cdot S_5 = 0 \quad , \quad a_2 = w \quad - \quad a_1 = \frac{1}{w} \quad r \quad (1)$$

$$q = \frac{a_2}{a_1}$$

$$q = \frac{w}{1/w}$$

$$q = w^2$$

$$q = (1 \text{ cis } r)^2$$

$$\boxed{q = \text{cis } 2r}$$

$$\cdot q = \text{cis } 2r \quad :$$

$$\cdot S_5 = 0 \quad , r \quad (2)$$

$$\cdot q^5 - 1 \quad , \quad S_5 = \frac{a_1(q^5 - 1)}{q - 1} \quad :$$

$$q^n - 1 = 0$$

$$(\text{cis } 2r)^5 - 1 = 0$$

$$\text{cis } 10r = 1$$

$$\text{cis } 10r = \text{cis } 360^\circ k$$

$$10r = 360^\circ k$$

$$r = 36^\circ k \quad , \quad 0 < r < \frac{f}{2}$$

$$k = 1 \quad \boxed{r = 36^\circ = \frac{f}{5}}$$

$$k = 2 \quad \boxed{r = 72^\circ = \frac{2f}{5}}$$

$$\cdot r = 72^\circ = \frac{2f}{5} \quad , \quad r = 36^\circ = \frac{f}{5} \quad :$$

$$f(x) = \ln\left(\frac{e^x}{e^x + 1}\right) \quad (1)$$

$x = 0$

$$\ln\left(\frac{e^x}{e^x + 1}\right) = 0$$

$$\frac{e^x}{e^x + 1} = 1$$

$$e^x = e^x + 1$$

$x = 0$

$$f(0) = \ln\left(\frac{e^0}{e^0 + 1}\right) = \ln\frac{1}{2} = -\ln 2$$

$$(0, -\ln 2) \quad (0, \ln \frac{1}{2})$$

$$f(x) = \ln\left(\frac{e^x}{e^x + 1}\right) \quad (2)$$

$x = 0$

$$\ln \frac{1}{2} < 0$$

$$(0, \ln \frac{1}{2})$$

$x = 0$

$$\ln\left(\frac{e^x}{e^x + 1}\right) = 0$$

$$\frac{e^x}{e^x + 1} = 1$$

$$e^x = e^x + 1$$

$x = 0$

(3)

$x \rightarrow -\infty$  ,  $y \rightarrow +\infty$   $x \rightarrow +\infty$  ,  $y \rightarrow 0$

$$\lim_{x \rightarrow \infty} \ln\left(\frac{e^x}{e^x + 1}\right) = \lim_{x \rightarrow \infty} \ln\left(\frac{e^x}{e^x}\right) = \lim_{x \rightarrow \infty} \ln(1) = 0$$

$$\lim_{x \rightarrow -\infty} \ln\left(\frac{e^x}{e^x + 1}\right) = \lim_{x \rightarrow -\infty} \ln\left(\frac{0}{0+1}\right) = \lim_{a \rightarrow 0} \ln(a) = -\infty$$

$$y = 0 \quad f(20) = -2 \cdot 10^{-9} \rightarrow 0^-$$

$$y = 0 \quad f(-100) = -100 \rightarrow -\infty$$

$f(x) = \ln\left(\frac{e^x}{e^x + 1}\right)$  (4)

$$f'(x) = \frac{e^x + 1}{e^x} \cdot \left(\frac{e^x(e^x + 1) - e^x e^x}{(e^x + 1)^2}\right)$$

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

$$f'(x) = \frac{e^x}{e^x(e^x + 1)}$$

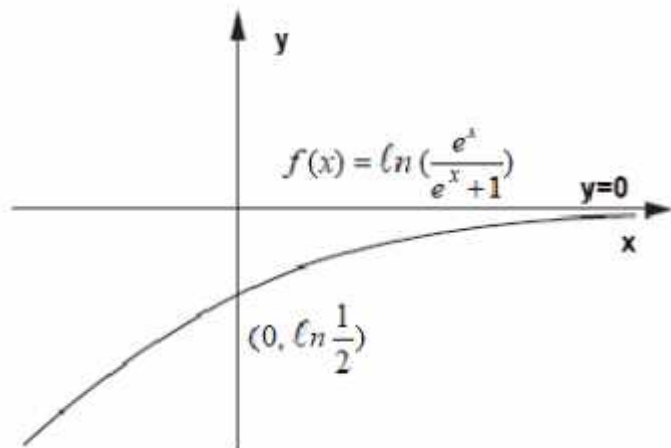
$$f'(x) = \frac{1}{e^x + 1}$$

$x$

$x$

$x$  - ,  $x$  - :

$f(x)$





$$f(x) = \ln\left(\frac{e^x}{e^x+1}\right) = \ln e^x - \ln(e^x+1) = x \ln e - \ln(e^x+1) = x - \ln(e^x+1) \quad (1)$$

$$y = x \quad f(x) = \ln\left(\frac{e^x}{e^x+1}\right) \quad (2)$$

$$\ln(e^x+1) > 0, \quad f(x) = x - \ln(e^x+1) \quad (1)$$

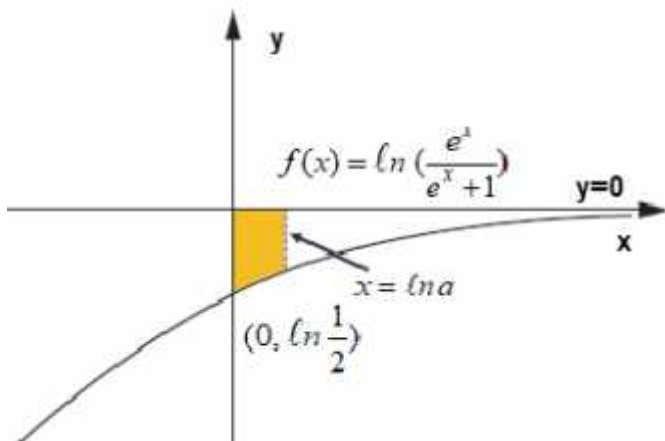
$$(a > 1 \quad \ln a > 0, \quad ) \quad \ln(e^x+1) > 0 \quad e^x+1 > 1, \quad e^x > 0$$

$$x \quad , g(x) = \frac{1}{\sqrt{e^x+1}}$$

(1)

$$x - \quad , x - \quad : \\ \ln a > 0 \quad , \quad a > 1 \quad (2)$$

$$\int \frac{1}{e^x+1} dx = f(x) + c = \ln\left(\frac{e^x}{e^x+1}\right) + c \quad (4)$$



$$V = f \int_0^{\ln a} \left(\frac{1}{\sqrt{e^x+1}}\right)^2 dx$$

$$V = f \int_0^{\ln a} \frac{1}{e^x+1} dx$$

$$V = f \ln\left(\frac{e^x}{e^x+1}\right) \Big|_0^{\ln a}$$

$$x = \ln a \quad f \left[ \ln\left(\frac{e^{\ln a}}{e^{\ln a}+1}\right) \right] = f \left[ \ln\left(\frac{a}{a+1}\right) \right]$$

$$x = 0 \quad f \left[ \ln\left(\frac{e^0}{e^0+1}\right) \right] = f \left[ \ln\left(\frac{1}{2}\right) \right]$$

$$V = f \left[ \ln\left(\frac{a}{a+1}\right) - \ln\left(\frac{1}{2}\right) \right]$$

$$V = f \left[ \ln\left(\frac{a}{\frac{a+1}{2}}\right) \right]$$

$$V = f \ln\left(\frac{2a}{a+1}\right)$$

$$m \geq 0, \quad f(x) = \frac{e^{-mx}}{1+x^2}$$

(1)

(2)

(3)

$$e^{0m} = e^0 = 1$$

$$x = 0$$

$$m$$

$$(0, 1)$$

$$(0, 1):$$

$$f'(x)$$

$$m \geq 0, \quad f(x) = \frac{e^{-mx}}{1+x^2}$$

(1)

$$f'(x) = \frac{-me^{-mx}(1+x^2) - 2xe^{-mx}}{(1+x^2)^2}$$

$$f'(x) = \frac{e^{-mx}[-m(1+x^2) - 2x]}{(1+x^2)^2}$$

$$f'(x) = \frac{e^{-mx}(-m - mx^2 - 2x)}{(1+x^2)^2}$$

$$f'(x) = \frac{e^{-mx}(-mx^2 - 2x - m)}{(1+x^2)^2}$$

$$-mx^2 - 2x - m$$

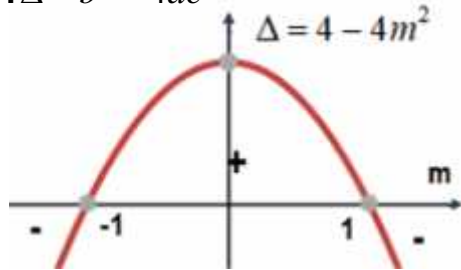
$$-2x$$

$$m = 0$$

$$-mx^2 - 2x - m$$

$$m > 0$$

$$\Delta = b^2 - 4ac$$



$$\Delta = (-2)^2 - 4(-m)(-m)$$

$$\Delta = 4 - 4m^2$$

$$0 = 4 - 4m^2 \rightarrow m = \pm 1 \rightarrow m = 1 \leftarrow m > 0$$

(ii)

$$m = 1$$

(iii)

$$(m > 0) \quad 0 < m < 1$$

(i)

$$(m > 0) \quad m > 1$$

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$m > 1$   $f'(x) :$  (i)  
 $m = 1, m = 0$   $f'(x) :$  (ii)  
 $m > 1$   $f'(x) :$  (iii)

$m \geq 0, m \neq 1$  (2)

$0 < m < 1$  I  
 $m > 1$  II  
 $m = 0$  III

$(x - \dots)$  ,  $x$  II  
 $m > 1$

$(x - \dots)$  , III  
 $(\dots)$

$(m \neq 1) m = 0$

$m = 0 : III$  ,  $m > 1$  : II ,  $0 < m < 1 : I$  :

$y - \dots, f(x) - f(-x)$   
 $f(x) - I - \dots, 0 < m < 1 -$

$y = 0$  ,  
 $x f(x)$  ,  $x f(-x)$

$f(-x) - (\dots) f(x)$

