

$(a > 0)$ a , $x^2 + y^2 = a^2$.

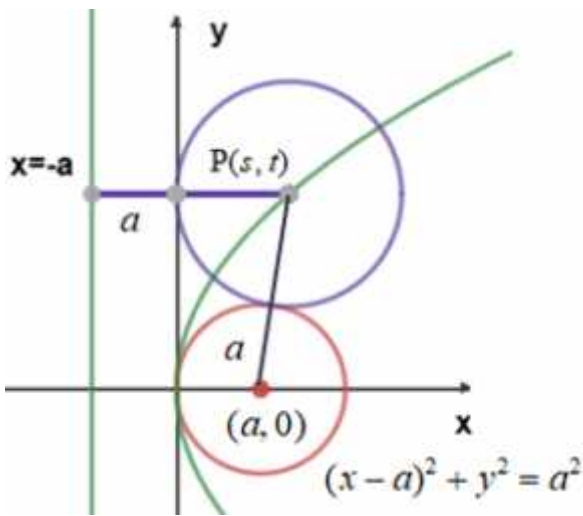
$(k > 0)$, $f(x - k, y)$, $f(x, y)$

$($, $)$ a y -

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

$(x - a)^2 + y^2 = a^2$, $(a, 0)$,

$(x - a)^2 + y^2 = a^2$:



s , $P(s, t)$.

s , y -

$s + a = \sqrt{(s - a)^2 + (t - 0)^2}$

$s^2 + 2as + a^2 = s^2 - 2as + a^2 + t^2$

$4as = t^2$

$y^2 = 4ax$

$x = -a$, $(a, 0)$, $y^2 = 4ax$

$(a, 0)$ $x = -a$ $P(s, t)$

$y^2 = 4ax$,

$y^2 = 4ax$ M $y = x + 3$.

$yy_0 = p(x + x_0)$,

$(-x_0, 0)$ x - $y = 0$

$y = 3 + 3 = 6 \rightarrow (3, 6)$: $x_0 = 3$, $(-3, 0)$ x - $y = x + 3$

$a = 3$ - , $6^2 = 4a \cdot 3$

$a = 3$:

"

$(3,0)$, $(x-3)^2 + y^2 = 9$

$y^2 = 12x$

$(3,6)$

$x -$

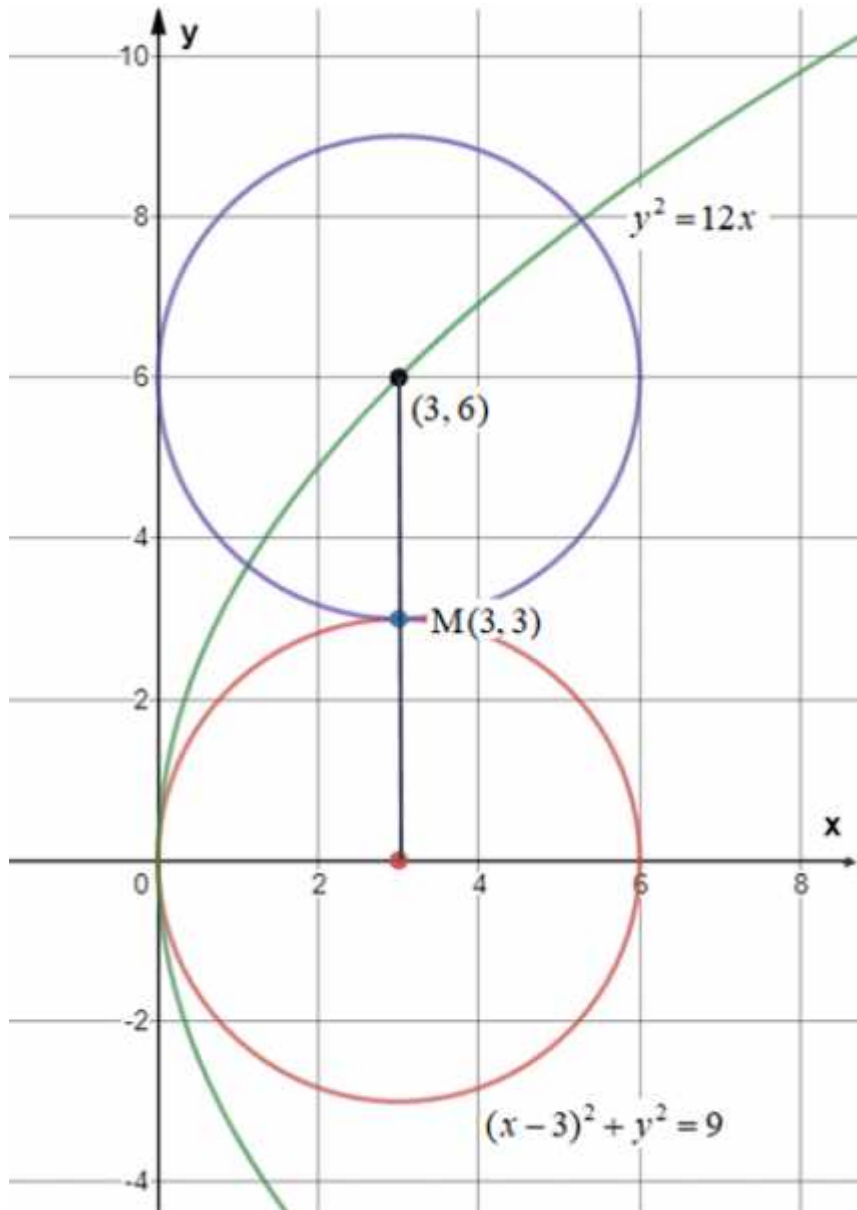
$x = 3$,

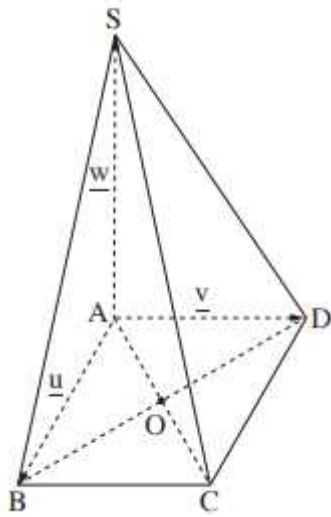
$x -$

$M(3,3)$

, 3

$M(3,3) :$





ABCD

SABCD

$$\boxed{\overline{AB} = \underline{u}} \quad \boxed{\overline{AD} = \underline{v}} \quad \boxed{\overline{AS} = \underline{w}}$$

$$\overline{SP} = t \cdot \overline{SD} \quad (t > 0)$$

$$\overline{SP} = t \cdot (\overline{SA} + \overline{AD})$$

$$\boxed{\overline{SP} = t\underline{v} - t\underline{w}}$$

$$\overline{OP} = \overline{OA} + \overline{AS} + \overline{SP}$$

$$\overline{OP} = -\frac{1}{2}(\underline{u} + \underline{v}) + \underline{w} + t\underline{v} - t\underline{w}$$

$$\boxed{\overline{OP} = -\frac{1}{2}\underline{u} + (t - \frac{1}{2})\underline{v} + (1-t)\underline{w}}$$

$$\overline{OP} = -\frac{1}{2}\underline{u} + (t - \frac{1}{2})\underline{v} + (1-t)\underline{w} :$$

SAB

OP

$$\overline{OP} \quad (1)$$

$$OP \quad t - \frac{1}{2} = 0 \rightarrow t = \frac{1}{2}$$

SAB

OP

(2)

P $t > 0$

SAB

$$OP, t = \frac{1}{2}$$

$$\boxed{\overline{AB} = \underline{u}} \quad \boxed{\overline{AD} = \underline{v}} \quad \boxed{\overline{AS} = \underline{w}}$$

$$\boxed{\overline{AB} = \underline{u}} \quad \boxed{|\underline{u}| = 4} \quad \boxed{u^2 = 16}$$

$$\boxed{\overline{AD} = \underline{v}} \quad \boxed{|\underline{v}| = 4} \quad \boxed{v^2 = 16}$$

$$\boxed{\overline{AS} = \underline{w}} \quad \boxed{|\underline{w}| = 4\sqrt{2}} \quad \boxed{w^2 = 32}$$

$$\underline{u} \cdot \underline{v} = 0 \leftarrow \underline{u} \perp \underline{v}$$

$$\left. \begin{array}{l} \underline{u} \cdot \underline{w} = 0 \\ \underline{v} \cdot \underline{w} = 0 \end{array} \right\} \leftarrow AS \perp ABCD$$

.SAD

\underline{u} -

$$\left. \begin{array}{l} \underline{u} \cdot \underline{v} = 0 \\ \underline{u} \cdot \underline{w} = 0 \end{array} \right\} \rightarrow \underline{u} \perp \text{SAD}$$

.SAD

OP

, \underline{u} - OP

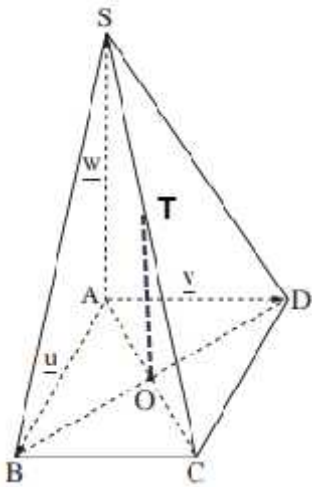
$$\sin \gamma = \frac{|\overline{OP} \cdot \underline{u}|}{|\overline{OP}| \cdot |\underline{u}|}$$

$$\overline{OP} = -\frac{1}{2}\underline{u} + (t - \frac{1}{2})\underline{v} + (1-t)\underline{w}$$

$$|\overline{OP}| = \sqrt{\frac{1}{4}\underline{u}^2 + (t - \frac{1}{2})^2 \underline{v}^2 + (1-t)^2 \underline{w}^2} \quad \leftarrow \underline{u} \cdot \underline{v} = 0, \underline{u} \cdot \underline{w} = 0, \underline{v} \cdot \underline{w} = 0$$

$$|\overline{OP}| = \sqrt{\frac{1}{4} \cdot 16 + (t - \frac{1}{2})^2 \cdot 16 + (1-t)^2 \cdot 32}$$

$$|\overline{OP}| = \sqrt{48t^2 - 80t + 40}$$



$$\overline{OP} \cdot \underline{u} = -\frac{1}{2}\underline{u}^2 = -\frac{1}{2} \cdot 16 = -8$$

$$\sin 45^\circ = \frac{|-8|}{\sqrt{48t^2 - 80t + 40} \cdot 4} \quad ()^2$$

$$48t^2 - 80t + 40 = 8$$

$$48t^2 - 80t + 32 = 0$$

$$\boxed{t=1} \quad \boxed{t = \frac{2}{3}}$$

.(D

$t=1$

,SD

P

) $t=1, t = \frac{2}{3}$:

.O

,

,

TABCD .

AS OT

$$.OT = \frac{AS}{2} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$

,ACS

OT ,AC

O

$$.V_{\text{TABCD}} = \frac{S_{\text{ABCD}} \cdot OT}{3} = \frac{4 \cdot 4 \cdot 2\sqrt{2}}{3} = \frac{32\sqrt{2}}{3}$$

$$. \frac{32\sqrt{2}}{3}$$

TABCD

:

$$q = \frac{a_2}{a_1} = iz, \quad a_2 = iz, \quad a_1 = 1 : \quad (1)$$

$$\begin{aligned} a_3 &= a_2 q = iz \cdot iz = -z^2 \\ a_4 &= a_3 q = -z^2 \cdot iz = -iz^3 \\ a_5 &= a_4 q = -iz^3 \cdot iz = z^4 \end{aligned}$$

$$a_5 = z^4, \quad a_4 = -iz^3, \quad a_3 = -z^2, \quad a_2 = iz, \quad a_1 = 1:$$

$$\frac{z^5 + i}{z + 1} \quad (2)$$

$$S_5 = \frac{a_1(q^5 - 1)}{q - 1} = \frac{1 \cdot [(iz)^5 - 1]}{iz - 1} = \frac{i^5 z^5 - 1}{iz - 1} = \frac{iz^5 - 1}{iz - 1} = \frac{i(z^5 + i)}{i(z + i)}$$

$$\boxed{S_5 = \frac{z^5 + i}{z + i}}$$

$$\frac{z^5 + i}{z + i}$$

$$z^5 = -i \quad (1)$$

$$z^5 = -i$$

$$z^5 = cis \ 270^\circ$$

$$z_k = cis \left(\frac{270^\circ}{5} + \frac{360^\circ k}{5} \right) = cis (54^\circ + 72^\circ k)$$

$$z_0 = cis (54^\circ), \quad z_1 = cis (126^\circ), \quad z_2 = cis (198^\circ),$$

$$z_3 = cis (270^\circ) = -i, \quad z_4 = cis (342^\circ)$$

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

$$z_0 = cis (54^\circ), \quad z_1 = cis (126^\circ), \quad z_2 = cis (198^\circ), \quad z_3 = cis (270^\circ) = -i, \quad z_4 = cis (342^\circ):$$

$$S_5 = 0, \quad 1 + iz - z^2 - iz^3 + z^4 = 0 \quad (2)$$

$$(1) \quad \frac{z^5 + i}{z + i} = 0 \rightarrow z^5 + i = 0 \rightarrow z^5 = -i$$

$$z = -i, \quad q = i \cdot (-i) = 1, \quad z = -i$$

$$1 + i(-i) - (-i)^2 - i(-i)^3 + (-i)^4 = 1 + 1 + 1 + 1 + 1 = 5, \quad -i$$

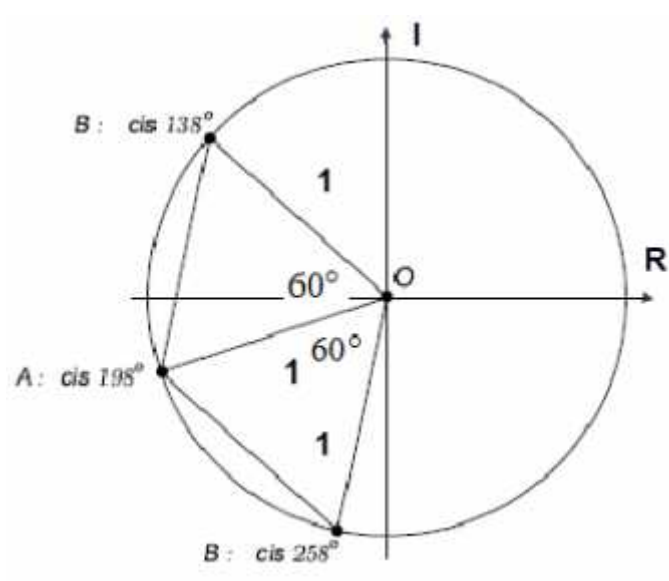
$$\frac{z^5 + i}{z + i}$$

$$cis (54^\circ), \quad cis (126^\circ), \quad cis (198^\circ), \quad cis (342^\circ):$$

$z_2 = cis(198^\circ)$, A .
 60° - , ΔABO
 .1 ,B , $|z_2| = |cis(198^\circ)| = 1$

$\angle AOB = 60^\circ$ - , ,

:
 $z_B = cis(198^\circ - 60^\circ) = cis 138^\circ$:
 $z_B = cis(198^\circ + 60^\circ) = cis 258^\circ$:
 $cis 258^\circ, cis 138^\circ$:



35582

19

$$-2 < a < 2, f(x) = \ln(x^2 + ax + 1)$$

$$x^2 + ax + 1 > 0$$

$$a^2 - 4 < 0, \Delta = b^2 - 4ac < 0,$$

$$x^2 + ax + 1 > 0, -2 < a < 2,$$

$$f(x) = \ln(x^2 + ax + 1)$$

 $f'(x) =$

$$f(x) = \ln(x^2 + ax + 1)$$

 $f'(x) =$

$$\ln(x^2 + ax + 1) = 0$$

$$x^2 + ax + 1 = 1$$

$$x(x + a) = 0$$

$$x = 0, x = -a$$

$$(-a, 0), (0, 0):$$

$$f(x) = \ln(x^2 + ax + 1)$$

$$f'(x) = \frac{2x + a}{x^2 + ax + 1}$$

$$2x + a = 0$$

$$x = -\frac{a}{2}$$

$$x = -\frac{a}{2}$$

$$2x + a$$

$$x = -\frac{a}{2}$$

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

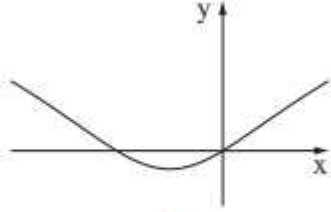
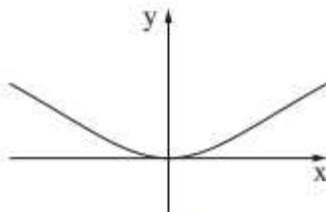
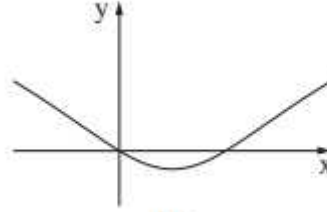
$$f\left(-\frac{a}{2}\right) = \ln\left(\frac{a^2}{4} - \frac{a^2}{2} + 1\right)$$

$$f\left(-\frac{a}{2}\right) = \ln\left(1 - \frac{a^2}{4}\right) \rightarrow \left(-\frac{a}{2}, \ln\left(1 - \frac{a^2}{4}\right)\right)$$

$$\left(-\frac{a}{2}, \ln\left(1 - \frac{a^2}{4}\right)\right):$$

"

a , $-$, $.$
 $(-\frac{a}{2}, \ln(1-\frac{a^2}{4}))$, $,$, $.$
 $y -$, $x -$,

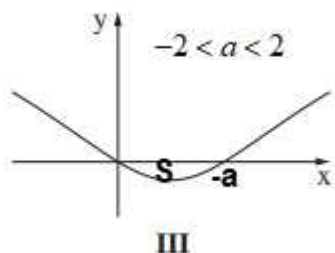
<p> $-\frac{a}{2} < 0$ $, -2 < a < 2$ (1) $0 < a < 2$ </p>  <p style="text-align: center;">I</p>	<p> $-\frac{a}{2} = 0$ $, -2 < a < 2$ (3) $a = 0$ $\ln(1-\frac{0^2}{4}) = \ln 1 = 0$ - </p>  <p style="text-align: center;">II</p>	<p> $-\frac{a}{2} > 0$ $, -2 < a < 2$ (2) $-2 < a < 0$ </p>  <p style="text-align: center;">III</p>
---	--	--

$0 < a < 2$ **(1)** - **I** , $a = 0$ **(3)** - **II** , $-2 < a < 0$ **(2)** - **III** :

S - , $-2 < a < 2$,

$(-a, 0)$, $(0, 0)$ x - ,

$$S = \int_0^{-a} [0 - \ln(x^2 + ax + 1)] dx = -\int_0^{-a} [\ln(x^2 + ax + 1)] dx -$$



$$\int_0^{-a} \ln(4x^2 + 4ax + 4) dx , S - a ,$$

$$\int_0^{-a} \ln(4x^2 + 4ax + 4) dx =$$

$$\int_0^{-a} \ln 4(x^2 + ax + 1) dx =$$

$$\int_0^{-a} [\ln 4 + \ln(x^2 + ax + 1)] dx = \leftarrow \log xy = \log x + \log y$$

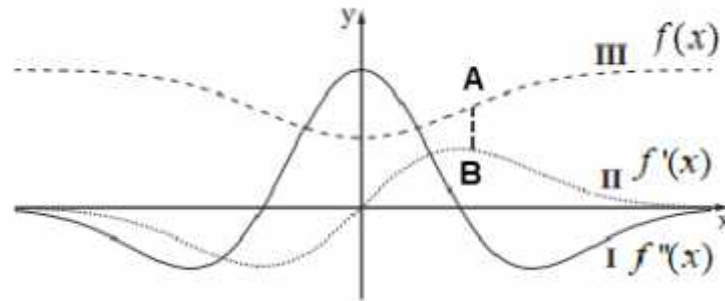
$$\int_0^{-a} \ln 4 dx + \int_0^{-a} \ln(x^2 + ax + 1) dx =$$

$$x \ln 4 \Big|_0^{-a} + (-S) =$$

$$\boxed{-a \ln 4 - S}$$

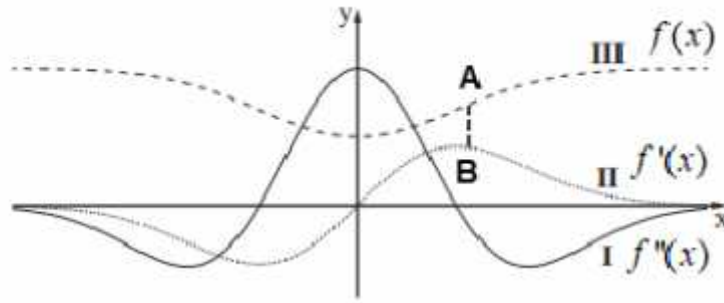
$$\int_0^{-a} \ln(4x^2 + 4ax + 4) dx = -a \ln 4 - S :$$

x - $f(x)$, $f'(x)$, $f''(x)$



x , x III •
 x , II •
 . III - , I •
 . II ,() , I •
 , , , , $f''(x)$ I •
 , III . III II •
 . $f(x)$ III , $f'(x)$ II •
 . $f(x)$ - III , $f'(x)$ - II , $f''(x)$ - I :

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



. y - , AB

$$B(t, f'(t)) - A(t, f(t)) :$$

$$, x_A = x_B = t$$

$$AB = y_A - y_B = f(t) - f'(t)$$

$$(AB)' = f'(t) - f''(t)$$

$$\boxed{f'(x) = xe^{-x^2}}$$

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

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

$$(AB)'(t) = te^{-t^2} - e^{-t^2}(1 - 2t^2)$$

$$\boxed{(AB)'(t) = e^{-t^2}(2t^2 + t - 1)}$$

$$e^{-t^2} > 0$$

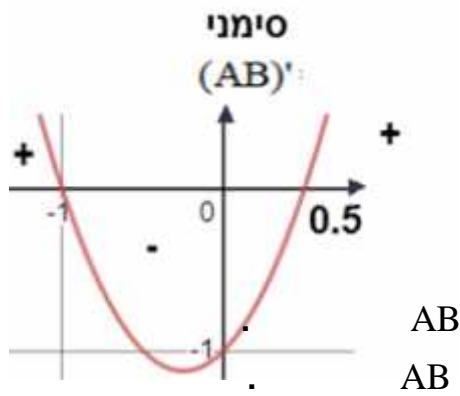
$$2t^2 + t - 1 = 0 \rightarrow t = -1, t = 0.5$$

$$2t^2 + t - 1$$

$$, t = -1$$

$$, t = 0.5$$

$$. x = -1, x = 0.5 :$$



AB

AB

$$AB(-1) = 1 + \frac{1}{2e}, \quad 1 + \frac{1}{2e} \quad AB$$

$$AB(-1) = 1 + \frac{1}{2e}$$

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

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

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

$$\boxed{f(-1) = 1 - \frac{1}{2e}}$$

$$, f(x)$$

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

$$f(x) = \int f'(x) dx$$

$$f(x) = \int xe^{-x^2} dx$$

$$f(x) = \int -\frac{1}{2}e^{-x^2} \cdot (-2x) dx$$

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

$$1 - \frac{1}{2e} = -\frac{1}{2}e^{-(-1)^2} + c \quad \leftarrow f(-1) = 1 - \frac{1}{2e}$$

$$1 - \frac{1}{2e} = -\frac{1}{2e} + c$$

$$\boxed{1 = c}$$

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

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