

$y = \dots$ ,  $( \quad )$   $x = \dots$ .

$y > x$ ,  $\frac{y}{x}$

	( " )	( )	
1	$\frac{1}{x}$	$x$	
1	$\frac{1}{y}$	$y$	
$\frac{y}{3x}$	$\frac{1}{x}$	$\frac{y}{3}$	
$\frac{x}{3y}$	$\frac{1}{y}$	$\frac{x}{3}$	

$$\frac{y}{3x} + \frac{x}{3y} = \frac{13}{18}$$

$$\frac{t}{3} + \frac{1}{3t} = \frac{13}{18} \quad \boxed{t = \frac{y}{x}}$$

$$6t^2 - 13t + 6 = 0$$

$$t_{1,2} = \frac{13 \pm 5}{12} \quad t = 1.5, \quad t \neq \frac{2}{3} \quad \Leftrightarrow \frac{y}{x} > 1 \Leftrightarrow y > x$$

$\dots$  1.5  $\dots$

$9:1.5 = 6$ ,  $9$

**168**

$x$

$6x$

$9x$

:

$$6x + 2 \cdot 9x = 168$$

$$6x + 18x = 168$$

$$24x = 168$$

$$x = 7$$

$\dots$  7  $\dots$  168  $\dots$

•  $a_1, a_2, a_3, \dots$  -

$2a_n = S_{\text{from } a_{n+1}}$  :

$\frac{a_1}{1-q} = 4$  : , 4

$$\begin{cases} 2a_n = S_{\text{from } a_{n+1}} \\ \frac{a_1}{1-q} = 4 \end{cases}$$

$2a_n = S_{\text{from } a_{n+1}}$

$2a_n = \frac{a_n \cdot q}{1-q} \quad /: a_n \neq 0$

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

$2 - 2q = q$

$2 = 3q$

$q = \frac{2}{3}$

$\frac{a_1}{1-\frac{2}{3}} = 4$

$a_1 = \frac{4}{3}$

•  $a_1 = \frac{4}{3}$  -  $a_1 + 2a_1 = 4$  ,  $2a_1$  ,  $a_1$

•  $\frac{a_1}{1-q} = 4 \rightarrow \frac{4}{3} = 4(1-q) \rightarrow q = \frac{2}{3}$

$2a_{10}$  ,

$2a_{10} = 2a_1 \cdot q^9 = \frac{4}{3} \cdot \left(\frac{2}{3}\right)^9 = \frac{4,096}{59049}$

•  $\frac{4,096}{59049}$  :

"

: (1).

-  $\bar{A}$  - A  
 -  $\bar{B}$  - B

$$N(A) = 4N(\bar{A}) \rightarrow P(A) = 4P(\bar{A})$$

$$1 - P(\bar{A}) = 4P(\bar{A}) \rightarrow P(\bar{A}) = 0.2 \rightarrow P(A) = 0.8$$

$$P(A/B) = \frac{5}{6} \rightarrow P(\bar{A}/B) = \frac{1}{6}$$

$$P(A/\bar{B}) = 0.75 \rightarrow P(\bar{A}/\bar{B}) = 0.25$$

$$P(B) = P \rightarrow P(\bar{B}) = 1 - P$$

$$P(A/B) = \frac{P(A \cap B)}{P(B)}$$

$$\frac{5}{6} = \frac{P(A \cap B)}{P}$$

$$P(A \cap B) = \frac{5}{6}P$$

$$\frac{5}{6}P$$

:

(2)

$$P(A \cap \bar{B}) = P(B) - P(A \cap B)$$

$$P(A \cap \bar{B}) = 0.8 - \frac{5}{6}P$$

$$P(\bar{B}) = 1 - P(B) = 1 - P$$

$$P(A/\bar{B}) = \frac{P(A \cap \bar{B})}{P(\bar{B})}$$

$$0.75 = \frac{0.8 - \frac{5}{6}P}{1 - P}$$

$$0.75 - 0.75P = 0.8 - \frac{5}{6}P$$

$$\frac{1}{12}P = 0.05$$

$$\boxed{P = 0.6}$$

P = 0.6 :

	$\bar{A}$	- A	
P		$\frac{5}{6}P$	- B
1 - P		$0.8 - \frac{5}{6}P$	- $\bar{B}$
1	0.2	0.8	

"

(1) .

	$\bar{A}$	- A	
0.6	0.1	0.5	- B
0.4	0.1	0.3	- $\bar{B}$
1	0.2	0.8	

$$P(\bar{B} / \bar{A}) = \frac{P(\bar{B} \cap \bar{A})}{P(\bar{A})} = \frac{0.1}{0.4} = 0.25$$

. 0.25 :

(2) .

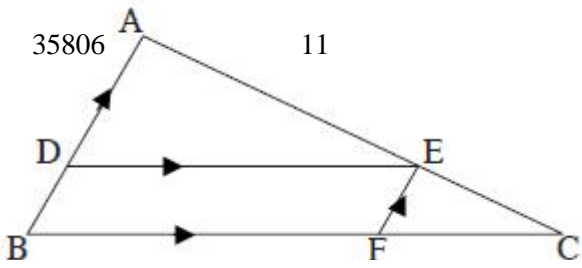
, , ,5 1  
,5 0 -  
, k = 0 , n = 5 ,( ) p = 0.75 ,

:

$$P_5(0) = \binom{5}{0} (0.75)^0 (1 - 0.75)^{5-0} = 1 \cdot (0.75)^0 (0.25)^5 = 0.25^5$$

$$1 - 0.25^5 = \frac{1023}{1024}$$

.  $\frac{1023}{1024}$  :



FE || BA .2 DE || BC .1

$S_{\Delta EFC} = S_2$  .4  $S_{\Delta ADE} = S_1$  .3

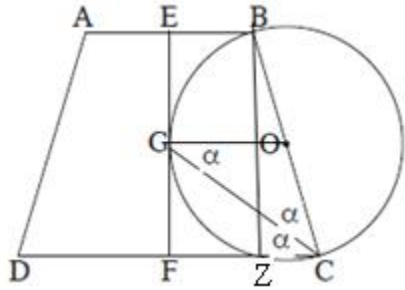
$$S_{\Delta BEF} = \sqrt{S_1 \cdot S_2} \cdot \frac{BF}{FC} \cdot : "$$

	DE    BC	5	1
	$\sphericalangle C = \sphericalangle AED$	6	5
	FE    BA	7	2
	$\sphericalangle FEC = \sphericalangle A$	8	7
	$\Delta ADE \sim \Delta EFC$	9	8,6
	$\frac{DE}{FC}$	10	9,8
	$S_{\Delta ADE} = S_1$	11	3
	$S_{\Delta EFC} = S_2$	12	4
	$\frac{DE}{FC} = \sqrt{\frac{S_1}{S_2}}$	13	9,11,12
	DE    BF	14	5
	EF    BD	15	7
	DEFB	16	15,14
	DE = BF	17	16
	$\frac{BF}{FC} = \sqrt{\frac{S_1}{S_2}} = \frac{\sqrt{S_1}}{\sqrt{S_2}}$	18	13
. . .			
	$\frac{h_{DE}}{h_{FC}} = \sqrt{\frac{S_1}{S_2}} = \frac{\sqrt{S_1}}{\sqrt{S_2}}$	19	13,9
	$S_{\Delta BEF} = \frac{BF \cdot h_{BF}}{2} = \frac{BF \cdot h_{FC}}{2}$	20	5

				,	
BF	<b>19</b>	$h_{FC}$	:		
			<b>,17</b>		
		$\Delta ADE$	$\frac{DE \cdot h_{DE}}{2} = S_2$		
				$S_{\Delta BEF} = \frac{DE \cdot h_{DE} \cdot \frac{\sqrt{S_2}}{\sqrt{S_1}}}{2}$	<b>21</b>
				$S_{\Delta BEF} = S_1 \cdot \frac{\sqrt{S_2}}{\sqrt{S_1}} = \sqrt{S_1 \cdot S_2}$	<b>,19 ,17 20</b>
. . .					



. 2 -	$EB + FC = 2GO$	<b>32</b>	<b>31</b>
. . .			



( ) ,DC BZ

( ) EBZF

( )  $BC = 2R$

( )  $\angle GCB = r$

( )  $\angle GCB = r$

( )  $\angle OGC = \angle GCB = r$

( )  $\angle GCF = \angle OGC = r$

↓

( )  $\angle GCF = \angle GCB = r$

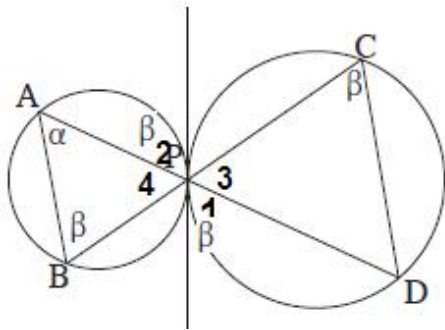
(  $\angle GCB - \angle GCF$  )  $\angle BCD = 2r$

$\triangle BZC$

$\sin 2r = \frac{BZ}{2R} \rightarrow BZ = 2R \sin 2r$

$. 2R \sin 2r$  :





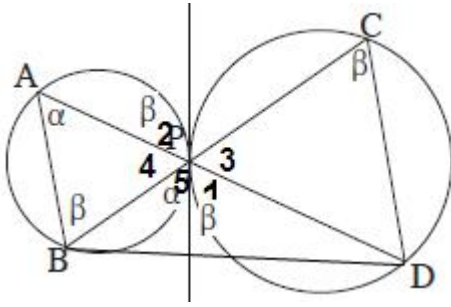
( )  $\sphericalangle P_1 = \sphericalangle C = s$   
 ( )  $\sphericalangle P_2 = \sphericalangle P_1 = s$   
 ( )  $\sphericalangle B = s$   
 ( ,  $AB \parallel CD$  ) ( )  $\sphericalangle B = \sphericalangle C$   
 ( )  $\sphericalangle P_3 = \sphericalangle P_4$   
 ( )  $\triangle ABP \sim \triangle DCP$   
 ( )  $\frac{CD}{AB} = \frac{3}{2}$  ,  
 . " 4.5  $\triangle DCP$   
 , "  $4.5 \cdot \frac{2}{3} =$  " 3  $\triangle ABP$

. " 3  $\triangle ABP$

∴ \_\_\_\_\_  
 ( )  $\sphericalangle P_3 = \sphericalangle P_4$   
 ( )  $\sphericalangle P_3 = \sphericalangle P_4 = \gamma$   
 ∴  
 $CD = 2 \cdot 4.5 \cdot \sin \gamma = 9 \cdot \sin \gamma$  ,  $AB = 2R \cdot \sin \gamma$

∴ "

$$\frac{9 \cdot \sin \gamma}{2R \cdot \sin \gamma} = \frac{3}{2} \Rightarrow 3R = 9 \Rightarrow R = 3$$



$$PD = 2 \cdot 4.5 \cdot \sin S = 9 \sin S, \quad BP = 2 \cdot 3 \cdot \sin r = 6 \sin r$$

$$\angle P_5 = r$$

$\triangle BDP$

$$BD^2 = BP^2 + DP^2 - 2BP \cdot DP \cdot \cos \angle BPD$$

$$BD^2 = (6 \sin r)^2 + (9 \sin S)^2 - 2 \cdot 6 \sin r \cdot 9 \sin S \cdot \cos(r + S)$$

$$BD^2 = 36 \sin^2 r + 81 \sin^2 S - 108 \sin r \sin S \cos(r + S)$$

$$BD = \sqrt{36 \sin^2 r + 81 \sin^2 S - 108 \sin r \sin S \cos(r + S)}$$

$$BD = \sqrt{36 \sin^2 r + 81 \sin^2 S - 108 \sin r \sin S \cos(r + S)} :$$

$$\frac{9 \sin S}{6 \sin r} = \frac{3}{2} \Rightarrow \sin S = \sin r, \quad \frac{PD}{PB} = \frac{3}{2}$$

,  $\triangle ABP$  -

.(  $180^\circ -$  )

$$BD = \sqrt{36 \sin^2 r + 81 \sin^2 r - 108 \sin r \sin r \cos(2r)}$$

$$BD = \sqrt{117 \sin^2 r - 108 \sin^2 r (1 - 2 \sin^2 r)}$$

$$BD = \sin r \sqrt{117 - 108 + 216 \sin^2 r}$$

$$BD = \sin r \sqrt{9 + 9 \cdot 24 \sin^2 r} \quad \leftarrow \sin r > 0$$

$$BD = 3 \sin r \sqrt{1 + 24 \sin^2 r}$$

$$a > 0, f(x) = \frac{ax}{\sqrt{x^2 - a^2}} \quad (1)$$

$$x = \pm a, \quad x^2 - a^2 > 0$$

$$x < -a \quad x > a : \quad (2)$$

$$f(x) = \frac{ax}{\sqrt{x^2 - a^2}} = \frac{ax}{|x|\sqrt{1 - \frac{a^2}{x^2}}}$$

$$\lim_{x \rightarrow +\infty} \frac{ax}{|x|\sqrt{1 - \frac{a^2}{x^2}}} = \lim_{x \rightarrow +\infty} \frac{ax}{x\sqrt{1 - \frac{a^2}{x^2}}} = a \rightarrow \boxed{y = a} \quad \lim_{x \rightarrow -\infty} \frac{ax}{|x|\sqrt{1 - \frac{a^2}{x^2}}} = \lim_{x \rightarrow -\infty} \frac{ax}{-x\sqrt{1 - \frac{a^2}{x^2}}} = -a \rightarrow \boxed{y = -a}$$

$$\lim_{x \rightarrow a^+} \frac{ax}{\sqrt{x^2 - a^2}} = \lim_{x \rightarrow a^+} \frac{a^2}{0^+} = +\infty \rightarrow \boxed{x = a} \quad \lim_{x \rightarrow a^-} \frac{ax}{\sqrt{x^2 - a^2}} = \lim_{x \rightarrow a^-} \frac{-a^2}{0^+} = -\infty \rightarrow \boxed{x = -a}$$

$$x = -a, x = a : \quad , (x \rightarrow -\infty)y = -a, (x \rightarrow +\infty)y = a : \quad :$$

(3)

$$f'(x) = a \cdot \frac{\sqrt{x^2 - a^2} - \cancel{x} \cdot x}{(\sqrt{x^2 - a^2})^2} = a \cdot \frac{x^2 - a^2 - x^2}{(x^2 - a^2)^2}$$

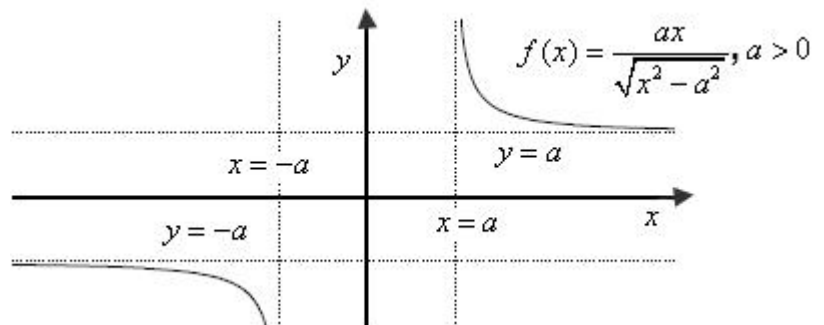
$$\boxed{f'(x) = \frac{-a^3}{(x^2 - a^2)\sqrt{x^2 - a^2}}}$$

$$x < -a \quad x > a, \quad a > 0$$

$$x : \quad , x < -a \quad x > a : \quad :$$

$$x \neq 0, y \quad (4)$$

$$x = 0 \quad x$$



$$a > 0, g(x) = f(x) - a$$

$$f(x), a, g(x), \quad (1)$$

$$y = -2a - y = 0 : a$$

$$, (x \rightarrow -\infty) y = -2a, y = 0 (x \rightarrow +\infty) :$$

$$x = -a, x = a :$$

$$y < -a \quad y > a \quad f(x) \quad (2)$$

$$y < -2a \quad y > 0 \quad g(x)$$

$$y < -2a \quad y > 0 :$$

$-0.5 \leq x \leq 2.5$

$f(x) = \cos(x^2 - 2x)$

$f(-0.5) = \cos((-0.5)^2 - 2 \cdot (-0.5)) = 0.315 \rightarrow (-0.5, 0.315), \quad f(2.5) = \cos(2.5^2 - 2 \cdot 2.5) = 0.315 \rightarrow (2.5, 0.315)$

$f'(x) = -(2x - 2)\sin(x^2 - 2x)$

$f'(x) = (2 - 2x)\sin(x^2 - 2x)$

$0 = 2 - 2x \rightarrow x = 1$

$0 = \sin(x^2 - 2x)$

$x^2 - 2x = f k$

$k = 0 \rightarrow x^2 - 2x = 0 \rightarrow x = 0, \quad x = 2$

$k = 1 \rightarrow x^2 - 2x = f$

$k = -1 \rightarrow x^2 - 2x = -f$

$(1, -1)$

$x^2 - 2x$

$(-0.5, 1.25), (2.5, 1.25)$

$-0.5 \leq x \leq 2.5$

$k = 0$

$f k$

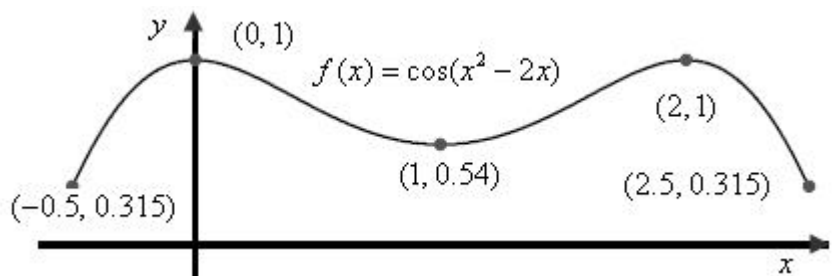
$-1 -$

$1.25$

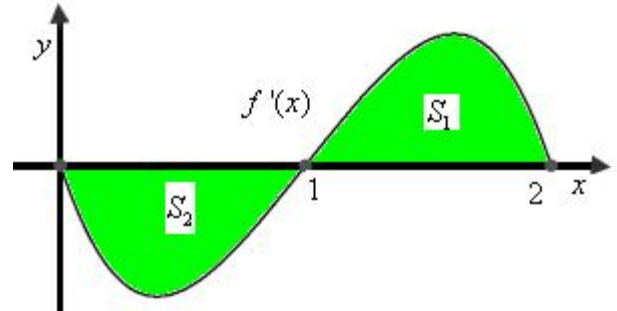
$f(0) = \cos(0^2 - 2 \cdot 0) = 1 \rightarrow (0, 1), \quad f(1) = \cos(1^2 - 2 \cdot 1) = 0.54 \rightarrow (1, 0.54), \quad f(2) = \cos(2^2 - 2 \cdot 2) = 1 \rightarrow (2, 1)$

-0.5		0		1		2		2.5	$x$
0.315		1		0.54		1		0.315	$f(x)$
	+	0	-	0	+	0	-		$f'(x)$
<b>Min</b>	↘	<b>Max</b>	↘	<b>Min</b>	↘	<b>Max</b>	↘	<b>Min</b>	

$(-0.5, 0.315), (1, 0.54), (2.5, 0.315), (2, 1), (0, 1) :$



$$\begin{aligned}
 & \text{, } 0 \leq x \leq 2 \text{ .} \\
 & \text{, } 1 < x < 2 \quad f'(x) > 0 \quad - \quad 0 < x < 1 \quad f'(x) < 0 \\
 & f'(0) = f'(1) = f'(2) = 0
 \end{aligned}$$



$$S_1 = \int_1^2 (f'(x) - 0) dx$$

$$S_1 = f(x) \Big|_1^2$$

$$S_1 = f(2) - f(1) = 1 - 0.54$$

$$\boxed{S_1 = 0.46}$$

$$S_2 = \int_0^1 (0 - f'(x)) dx$$

$$S_2 = -f(x) \Big|_0^1$$

$$S_2 = -f(1) + f(0) = -0.54 + 1$$

$$\boxed{S_2 = 0.46}$$

$$S = 0.46 + 0.46 = 0.92 \text{ :}$$

$$\text{. " } 0.92 \text{ :}$$

מינימום זמן הליכתו של האדם לנקודה A.

, FL = 0.3 , , CD F EF = x

$$EL = \sqrt{x^2 - 0.09}$$

$$\frac{0.4 - \sqrt{x^2 - 0.09}}{6} \quad 0.4 - \sqrt{x^2 - 0.09}$$

$$\frac{x}{4} \quad x$$

$$f(x) = \frac{0.4 - \sqrt{x^2 - 0.09}}{6} + \frac{x}{4} : \quad " \quad ,$$

, 0.3 < x < 0.5

: , ( " ) AC 0.5

$$EL - " = " , x^2 - 0.09 " (I)$$

$$, ( ) x - 0 < x < 0.5 (II)$$

$$f(x) = \frac{0.4 - \sqrt{x^2 - 0.09}}{6} + \frac{x}{4}$$

$$f'(x) = \frac{-2x}{6\sqrt{x^2 - 0.09}} + \frac{1}{4}$$

$$f'(x) = \frac{-2x + 3\sqrt{x^2 - 0.09}}{12\sqrt{x^2 - 0.09}}$$

$$0 = -2x + 3\sqrt{x^2 - 0.09}$$

$$2x = 3\sqrt{x^2 - 0.09}$$

$$4x^2 = 9x^2 - 0.81$$

$$0.81 = 5x^2$$

$$x^2 = 0.162$$

$$x = 0.402 \leftarrow x > 0$$

$$f'(0.4) = \frac{-2 \cdot 0.4 + 3\sqrt{0.4^2 - 0.09}}{12\sqrt{0.4^2 - 0.09}} = -0.6 < 0, \quad f'(0.45) = \frac{-2 \cdot 0.45 + 3\sqrt{0.45^2 - 0.09}}{12\sqrt{0.45^2 - 0.09}} = 0.006 > 0$$

$$x = 0.402, \text{ Min}$$

.A , " 0.402 EF :

