

( , " )

v -

v + 2

( )

t -

t - 0.5

:

s - "	v - "	t -		
vt	v	t		
(v + 2)(t - 0.5)	v + 2	t - 0.5		
0.5(v + 2)	v + 2	0.5		

. vt = (v + 2)(t - 0.5) :

9 < t(v + 2) < 25 , ,

:

t

$$vt = (v + 2)(t - 0.5)$$

$$vt = vt - 0.5v + 2t - 1$$

$$2t = 0.5v + 1$$

$$t = 0.25v + 0.5$$

9 < 0.25v<sup>2</sup> + v + 1 < 25 ← 9 < (0.25v + 0.5)(v + 2) < 25 -

0.25v<sup>2</sup> + v + 1 > 9

0.25v<sup>2</sup> + v + 1 < 25

0.25v<sup>2</sup> + v - 8 > 0

0.25v<sup>2</sup> + v - 24 < 0

v<sub>1,2</sub> =  $\frac{-1 \pm 3}{0.5}$  → v = 4, -8

v<sub>1,2</sub> =  $\frac{-1 \pm 5}{0.5}$  → v = 8, -12

,  
v > 0

,  
v > 0

v > 4

0 < v < 8

. 4 < v < 8

. " 4 < v < " 8 , (4, 8)

v :

"

$$1^2 + 2^2 + 3^2 + \dots + n^2 \stackrel{?}{=} (1+2+3+\dots+n)^2 \quad (1)$$

$$.1=1 \quad n=1$$

$$.5 < 9 \quad n=2$$

$$1^2 + 2^2 + 3^2 + \dots + n^2 \stackrel{?}{\leq} (1+2+3+\dots+n)^2 :$$

$$, n=1 \quad .1 \quad (2)$$

$$, n=k \quad .2$$

$$1^2 + 2^2 + 3^2 + \dots + k^2 \leq (1+2+3+\dots+k)^2 :$$

$$, n=k+1 \quad .3$$

$$1^2 + 2^2 + 3^2 + \dots + k^2 + (k+1)^2 \leq (1+2+3+\dots+k+k+1)^2$$

$$\Leftrightarrow (1+2+3+\dots+k)^2 + (k+1)^2 \leq \boxed{(1+2+3+\dots+k)^2} + 2(1+2+3+\dots+k)(k+1) + \boxed{(k+1)^2}$$

$$, \quad , \quad - ,$$

$$. \quad k \quad 2(1+2+3+\dots+k)(k+1)$$

$$, n=1 \quad .4$$

$$, n=k$$

$$n=k+1$$

$$. \quad n \quad , \quad - ,$$

$$58, 62, 66, \dots, (4n+6) \quad ,$$

$$(\dots \quad n \quad ) \quad k -$$

$$a_1 = 58, \quad d = 4, \quad a_k = 4n + 6 :$$

$$a_n = a_1 + (n-1)d$$

$$4n + 6 = 58 + (k-1) \cdot 4$$

$$4n + 6 = 58 + 4k - 4$$

$$4n - 48 = 4k$$

$$\boxed{k = n - 12} \quad o.k. \leftarrow n - 12 > 0$$

$$S_n = \frac{n(a_1 + a_n)}{2}$$

$$S_{n-12} = \frac{(n-12)(58 + 4n + 6)}{2}$$

$$S_{n-12} = (n-12)(2n + 32)$$

$$S_{n-12} = 2n^2 + 8n - 384$$

$$. 2n^2 + 8n - 384 \quad :$$

.6 - 3 ,

 $\frac{1}{3}$ ,

3 -

$$\frac{1}{3} \cdot \frac{k}{2k} \cdot \frac{k-1}{2k-1} = \frac{15}{7} \cdot \frac{2}{3} \cdot \frac{k}{4k} \cdot \frac{k-1}{4k-1} :$$

$$\frac{1}{3} \cdot \frac{k}{2k} \cdot \frac{k-1}{2k-1} = \frac{15}{7} \cdot \frac{2}{3} \cdot \frac{k}{4k} \cdot \frac{k-1}{4k-1} \quad /: k-1 > 0$$

$$\frac{1}{6(2k-1)} = \frac{5}{14(4k-1)} \quad / \cdot 42(2k-1)(4k-1)$$

$$7(4k-1) = 15(2k-1)$$

$$28k - 7 = 30k - 15$$

$$\boxed{k=4}$$

. k = 4 :

. 12 - 4 II , 4 - 4 I

$$P(2 \text{ women}) = \frac{1}{3} \cdot \frac{4}{8} \cdot \frac{3}{7} + \frac{2}{3} \cdot \frac{4}{16} \cdot \frac{3}{15} = \frac{11}{105}$$

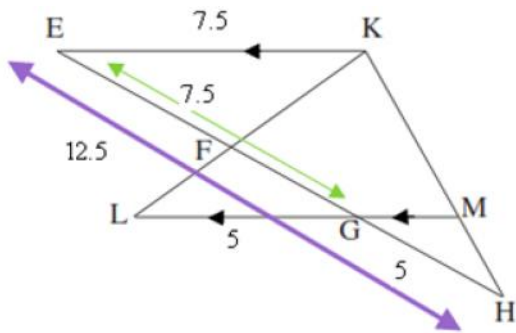
$$\cdot \frac{11}{105} \quad :$$

,I

$$P(\text{שני גברים מחדר I} \mid \text{לפחות גבר אחד}) = \frac{P(\text{שני גברים מחדר I} \cap \text{לפחות גבר אחד})}{P(\text{לפחות גבר אחד})}$$

$$= \frac{\frac{1}{3} \cdot \frac{4}{8} \cdot \frac{3}{7}}{1 - \frac{11}{105}} = \frac{\frac{1}{14}}{\frac{94}{105}} = \frac{15}{188}$$

$$\cdot \frac{15}{188} \quad :$$



$\sphericalangle KML = \sphericalangle KFH$  .2       $GM \parallel EK$  .1

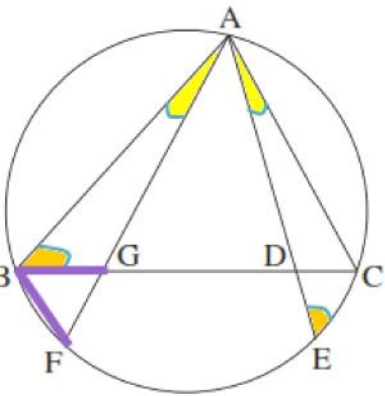
$LG = \text{" } 5$  .5     $EH = \text{" } 12.5$  .4     $\frac{EF}{GE} = \frac{3}{5}$  .3 .

$\frac{MH}{KH}$  . (2)     $EK$  (1) .     $\triangle KHE \sim \triangle FLG$  . : "

		'	
	$GM \parallel EK$	6	1
	( ) $\sphericalangle E = \sphericalangle FGL$	7	6
	$\sphericalangle KML = \sphericalangle KFH$	8	2
$180^\circ -$	$\sphericalangle HKE = 180^\circ - \sphericalangle KML$	9	8
$180^\circ -$	$\sphericalangle LFG = 180^\circ - \sphericalangle KFH$	10	
	( ) $\sphericalangle LFG = \sphericalangle HKE$	11	10, 9, 8
..	$\triangle KHE \sim \triangle FLG$	12	10, 7
. . .			
	$\frac{KH}{FL} = \frac{KE}{FG} = \frac{HE}{LG}$	13	12
	$EH = \text{" } 12.5$	14	4
	$LG = \text{" } 5$	15	5
	$\frac{EF}{GE} = \frac{3}{5}$	16	3
2	$\frac{EK}{LG} = \frac{3}{2}$	17	6
	$EK = \text{" } 7.5$	18	17, 15
(1) . . .			
	$FG = \text{" } 3$	32	18, 16, 13
	$EG = \text{" } 7.5$	33	32, 16
	$GH = \text{" } 5$	34	33, 14
1	$\frac{MH}{KH} = \frac{5}{12.5}$ $\frac{MH}{KH} = \frac{2}{5}$	35	34, 14, 6
(2) . . .			

35806

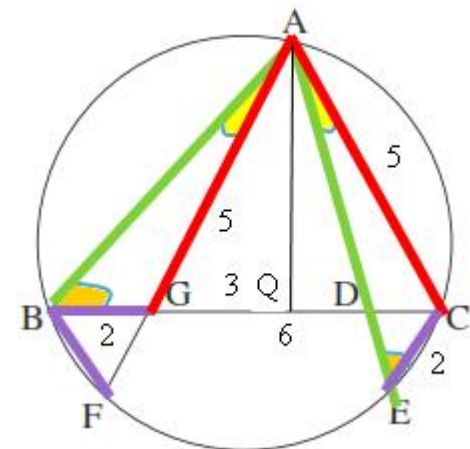
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- $\sphericalangle BAF = \sphericalangle CAE$  .2  $BF = BG$  .1  
 .GC = " 6 .5 .AC = " 5 .4 CE = " 2 .3 :  
 AE .  $\triangle AGB \cong \triangle ACE$  . : "

		'	
	( ) $\sphericalangle BAF = \sphericalangle CAE$	6	2
	$BF = BG$	7	1
	$BF = EC$	8	6
	( ) $EC = BG$	9	8,7
(AC)	( ) $\sphericalangle ABG = \sphericalangle AEC$	10	
	$\triangle AGB \cong \triangle ACE$	11	10,9,6
...			

ונצבור לטריאונל אסציון קי'



- .GC = " 6 .5 .AC = " 5 .4 CE = " 2 .3 :  
 .AB = AE - BG = CE = 2 , AG = AC = 5 , ,  
 .AGC GC AQ

.GQ = " 3 ,

$\triangle AQC - \cos \sphericalangle AGC$

$\cos \sphericalangle AGB = -0.6$        $\cos \sphericalangle AGQ = \frac{3}{5} = 0.6$

(.cos r = -cos(180° - r) - 180° - )

(AE , AB )  $\triangle ABG$

$(AB)^2 = (BG)^2 + (AG)^2 - 2BG \cdot AG \cdot \cos \sphericalangle AGB$

$(AB)^2 = 2^2 + 5^2 - 2 \cdot 2 \cdot 5 \cdot (-0.6)$

$AB = \sqrt{41} \rightarrow \boxed{AC = \sqrt{41}}$

. AC = "  $\sqrt{41}$  :

"

.60° - ABC .

. - ∠TBA = r

ΔTBC

$$(TC)^2 = (BT)^2 + (BC)^2 - 2BT \cdot BC \cdot \cos \angle TBC$$

$$n^2 = d^2 + 2^2 - 2 \cdot 2 \cdot d \cdot \cos r$$

$$\cos r = \frac{d^2 - n^2 + 4}{4d}$$

ΔABT

$$(AT)^2 = (BA)^2 + (BT)^2 - 2BA \cdot BT \cdot \cos \angle ABT$$

$$t^2 = 2^2 + d^2 - 2 \cdot 2 \cdot d \cdot \cos(60^\circ - r)$$

$$\cos(60^\circ - r) = \frac{d^2 - t^2 + 4}{4d}$$

$$d^2 \quad ,$$

$$\cos r - \cos(60^\circ - r) = \frac{d^2 - n^2 + 4 - (d^2 - t^2 + 4)}{4d}$$

$$-2 \sin(30^\circ) \sin(r - 30^\circ) = \frac{t^2 - n^2}{4d}$$

$$\boxed{\sin(r - 30^\circ) = \frac{n^2 - t^2}{4d}}$$

. :

,ATC .

$$S_{\Delta ATC} = S_{\Delta ABC} - S_{\Delta ATB} - S_{\Delta BTC}$$

$$S_{\Delta ATC} = 0.5 \cdot 2^2 \sin(60^\circ) - 0.5 \cdot 2 \cdot d \cdot \sin(60^\circ - r) - 0.5 \cdot 2 \cdot d \sin r$$

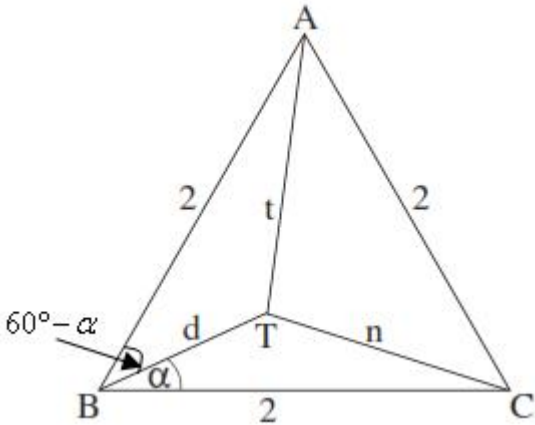
$$) \boxed{S_{\Delta ATC} = \sqrt{3} - d \cdot (\sin(60^\circ - r) + \sin r)}$$

$$S_{\Delta ATC} = \sqrt{3} - d \cdot (2 \sin 30^\circ \cos(30^\circ - r))$$

$$\boxed{S_{\Delta ATC} = \sqrt{3} - d \cos(30^\circ - r)}$$

$$. S_{\Delta ATC} = \sqrt{3} - d \cos(30^\circ - r) \quad S_{\Delta ATC} = \sqrt{3} - d \cdot (\sin(60^\circ - r) + \sin r) :$$

"



$\cos r - \cos S$  - , ,

$f(x) = \frac{6}{x^2 + 3a^2}$  ,  $a > 0$  ,

$$(a > 0)3a^2 , \quad , x^2 , \quad , \quad (1)$$

$(0, \frac{2}{a^2})$   $x=0$   $y$  ,  $y=0$   $x$  (2)

$(0, \frac{2}{a^2})$  :  $f(x)$  (3)

$y=0$  ,  $\lim_{x \rightarrow \infty} f(x) = \frac{6}{x^2 + 3a^2} = \lim_{x \rightarrow \infty} \frac{\frac{6}{x^2}}{1 + \frac{3a^2}{x^2}} = \lim_{x \rightarrow \infty} \frac{0}{1+0} = 0$

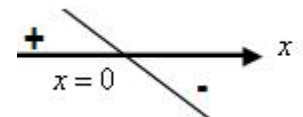
$y=0$  : (4)

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

$0 = -12x$

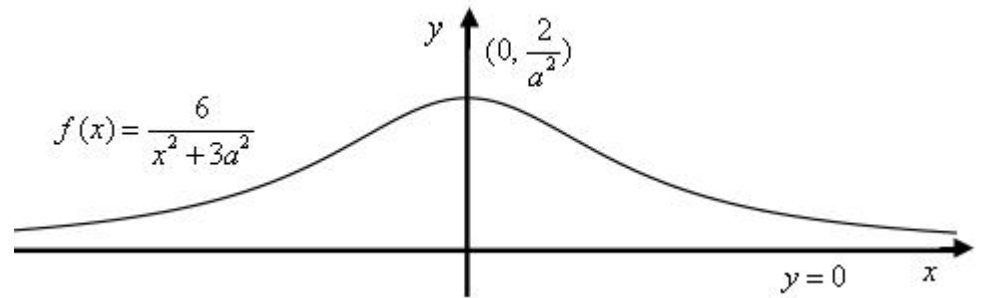
$x=0 \rightarrow (0, \frac{2}{a^2})$

( )



$x=0$

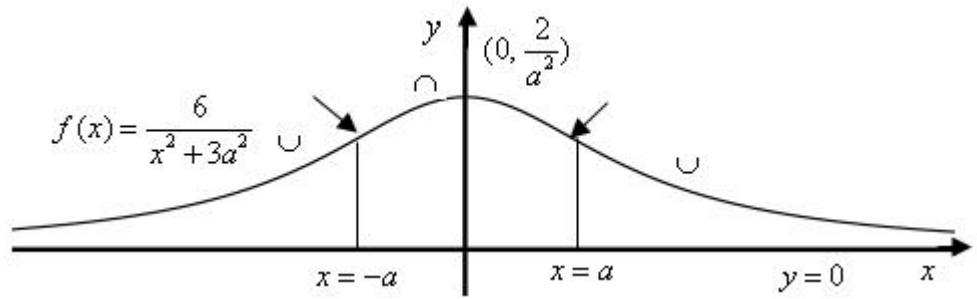
$(0, \frac{2}{a^2})$  :





( )

(1).



$$-a < x < a$$

$$f''(x) \cdot x < -a \quad x > a :$$

$$f''(x) :$$

$$f'(x)$$

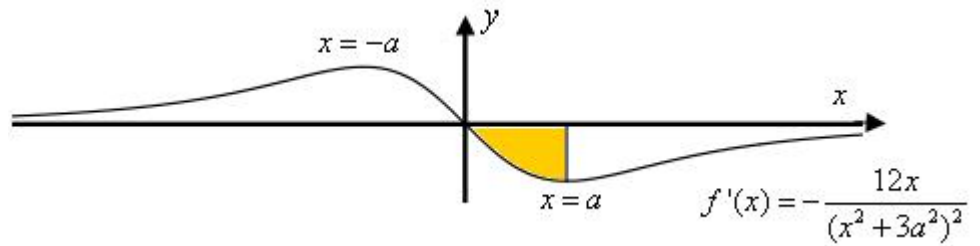
$$f''(x) \quad x = a$$

(2)

$$f'(x)$$

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

$$x = -a, \quad x = a :$$



$$S = \int_0^a (0 - f'(x)) dx = -f(x) \Big|_0^a = -f(a) + f(0) = \frac{-6}{4a^2} + \frac{2}{a^2} = \frac{1}{2a^2}$$

$$" \quad \frac{1}{2a^2} \quad :$$

$$.0 \leq x \leq 3f \quad f(x) = -\sqrt{\sin x} + \frac{1}{2} \sin x :$$

$$.2f \leq x \leq 3f \quad 0 \leq x \leq f \quad , \quad , \quad \sin x \quad (1)$$

$$.2f \leq x \leq 3f \quad 0 \leq x \leq f \quad :$$

$$: \quad , \quad (2)$$

$$f(0) = -\sqrt{\sin 0} + 0.5 \sin 0 = 0 \rightarrow \boxed{(0,0)}$$

$$f(f) = -\sqrt{\sin f} + 0.5 \sin f = 0 \rightarrow \boxed{(f,0)}$$

$$f(2f) = -\sqrt{\sin 2f} + 0.5 \sin 2f = 0 \rightarrow \boxed{(2f,0)}$$

$$f(3f) = -\sqrt{\sin 3f} + 0.5 \sin 3f = 0 \rightarrow \boxed{(3f,0)}$$

$$f'(x) = \frac{-\cos x}{2\sqrt{\sin x}} + \frac{1}{2} \cos x$$

$$\boxed{f'(x) = \frac{\cos x(-1 + \sqrt{\sin x})}{2\sqrt{\sin x}}}$$

$$\cos x = 0 \quad \sin x = 1$$

$$x = \frac{f}{2} + fk \quad x = \frac{f}{2} + 2fk$$

$$x = \frac{f}{2} \rightarrow f\left(\frac{f}{2}\right) = -\sqrt{\sin \frac{f}{2}} + 0.5 \sin \frac{f}{2} = -0.5 \rightarrow \boxed{\left(\frac{f}{2}, -0.5\right)}$$

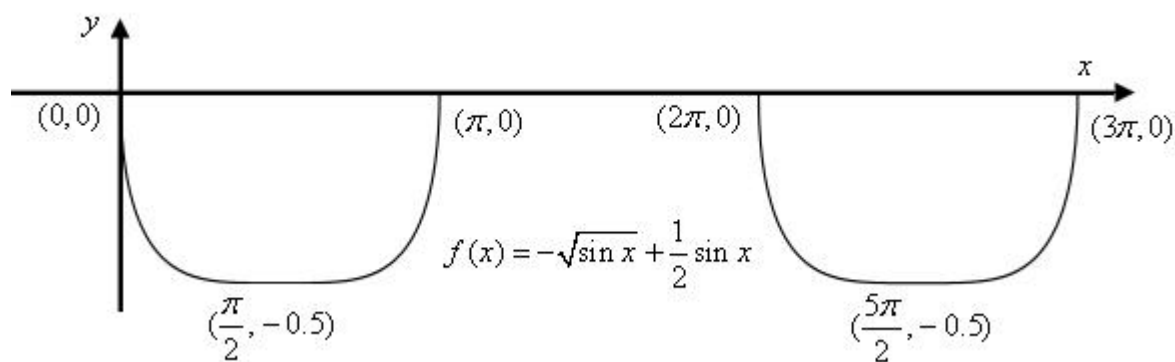
$$x = \frac{5f}{2} \rightarrow f\left(\frac{5f}{2}\right) = -\sqrt{\sin \frac{5f}{2}} + 0.5 \sin \frac{5f}{2} = -0.5 \rightarrow \boxed{\left(\frac{5f}{2}, -0.5\right)}$$

$$\cos x = 0 \quad x = \frac{3f}{2}$$

0		$\frac{f}{2}$		$f$		$2f$		$\frac{5f}{2}$		$3f$	$x$
0		-0.5		0		0		-0.5		0	$f(x)$
											$f'(x)$
<b>Max</b>	↘	<b>Min</b>	↗	<b>Max</b>		<b>Max</b>	↘	<b>Min</b>	↗	<b>Max</b>	

$$(3f,0), (2f,0), (f,0), (0,0), \left(\frac{5f}{2}, -0.5\right), \left(\frac{f}{2}, -0.5\right) :$$

(1) .



.  $y = -0.5$  ,

(2)

$y = -0.5$  :

.  $f(x) > 0$  - ,  $-\sqrt{\sin x} + \frac{1}{2} \sin x > 0$

$\frac{1}{2} \sin x > \sqrt{\sin x}$  .

$x$  :

מינימום סכום שטחי המצולף והריבוע.

$$.2f r$$

$r -$

$$\frac{k-2f r}{4}$$

$$k-2f r$$

:

$$S = f r^2 + \left(\frac{k-2f r}{4}\right)^2$$

$$s = f r^2 + \frac{1}{16}(k-2f r)^2$$

.

$$S'(r) = 2f r + \frac{1}{16} \cdot 2(k-2f r)(-2f)$$

$$S'(r) = \frac{8f r - f(k-2f r)}{4}$$

$$S'(r) = \frac{f}{4}(8r - k + 2f r)$$

$$S'(r) = \frac{f}{4}((8+2f)r - k)$$

$$(8+2f)r - k = 0$$

$$r = \frac{k}{8+2f}$$

$$s''(r) = \frac{f}{4}(8+2f)$$

$$s''(r) > 0 \rightarrow \text{Min}$$

$$\frac{5f}{f+4}$$

$$2f \cdot \frac{k}{8+2f} = \frac{5f}{f+4}$$

$$\frac{k}{f+4} = \frac{5}{f+4}$$

$$k = 5$$

. $k = 5$ :