

הפיתרון מוצע ע"י ניר דהן

גיל מועד 806
מועד א'

(1)

① $7x + 3y = 0.6$

כאן	הסבין	נ"ל	כיום המסלול
7x	x	7	פול א'
3y	y	3	פול ב'
			<u>כיום המסלול</u>

$t x + 7 x = 0.5$ (כאן המסלול) $t x$ x t פול א'
 $t y + 3 y = 0.5$ (כאן המסלול) $t y$ y t פול ב'

$$x = \frac{0.5}{t+7}$$

$$y = \frac{0.5}{t+3}$$

נ"ב בלשונה 1

$$\frac{3.5}{t+7} + \frac{1.5}{t+3} = 0.6 \quad \frac{t^2 + 10t + 21}{(t+7)(t+3)}$$

$$3.5t + 10.5 + 1.5t + 10.5 = 0.6t^2 + 6t + 12.6$$

$$0.6t^2 + t - 8.4 = 0$$

$$t_{1,2} = \frac{-1 \pm 4.6}{1.2}$$

$t_1 = 3$
 $t_2 = -4 \frac{2}{3} \quad t > 0$

המסלול 3 ב' 3 א' 180

(2) $a_1, a_2, a_3, \dots, a_{n-1}, a_n$
 $d = d$

$a_2^2 - a_1^2, a_3^2 - a_2^2, \dots, a_n^2 - a_{n-1}^2$

(b) $a_{n+1} - a_n = \frac{a_{n+1}^2 - a_n^2}{a_{n+1} + a_n} - \left[\frac{a_n^2 - a_{n-1}^2}{a_n + a_{n-1}} \right]$

$= \frac{(a_{n+1} - a_n)(a_{n+1} + a_n)}{a_n + d + a_n} - \left[\frac{(a_n - a_{n-1})(a_n + a_{n-1})}{a_n + a_{n-1} - d} \right]$

$= d(2a_n + d) - [d(2a_n - d)]$

$\cancel{2a_n d} + d^2 - \cancel{2a_n d} + d^2 = \underline{\underline{2d^2}}$
K.M

$\Rightarrow a_2^2 - a_1^2 = 64$

מכאן נניח ש a_1 ו a_2 הם מספרים טבעיים

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

$a_n = \underbrace{a_2^2 - a_1^2}_{64} + (n-2) \cdot 2d^2$

$a_n^2 - a_{n-1}^2 = 64 + 2nd^2 - 4d^2$

(c) $a_n^2 - a_{n-1}^2 = 192 \quad d^2 > 1$

$64 + 2nd^2 - 4d^2 = 192$

$\Rightarrow nd^2 - 2d^2 = 64 \Rightarrow n = \frac{64 + 2d^2}{d^2} = \frac{64}{d^2} + 2$

$d^2 > 1 \Rightarrow 0 < \frac{64}{d^2} < 64$

$\Rightarrow \boxed{2 < n < 66} \quad \underline{\underline{K.M}}$

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3) a) $P(\text{השטר דבורה}) = p$

$P(\text{4 מיון 3-7}) = 1 - p^4$
ע השטר דבורה?

$\Rightarrow 1 - p^4 = \frac{255}{256} \Rightarrow \boxed{p = 0.25} = 25\%$

ל- 25% מהמקרים. ע השטר דבורה.

b) $P(\text{4 מיון 3-7}) = \binom{4}{3} \cdot 0.75^3 \cdot 0.25 = \frac{27}{64}$

c)

	דברים	מים	P
	$\bar{A}$	A	P
ע השטר	0.25	0.15	0.4
ל- השטר	0.75	0.45	0.3
	1	0.6	0.4

A - מים
 $\bar{A}$ - דברים
B - ע השטר דבורה
 $\bar{B}$ - ל- השטר

$P(A) = 0.4$ (מיון)

$\Rightarrow P(\bar{A}) = 0.6$

$P(B) = 0.25$ (ל- 100 מיון)

$\Rightarrow P(\bar{B}) = 0.75$

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

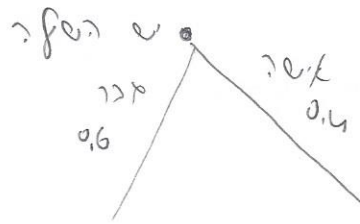
$\Rightarrow P(\bar{A} \cap B) = 0.25 - 0.1 = 0.15$

$P(\bar{A} \cap \bar{B}) = 0.6 - 0.15 = 0.45$

$P(A \cap \bar{B}) = 0.75 - 0.45 = 0.3$



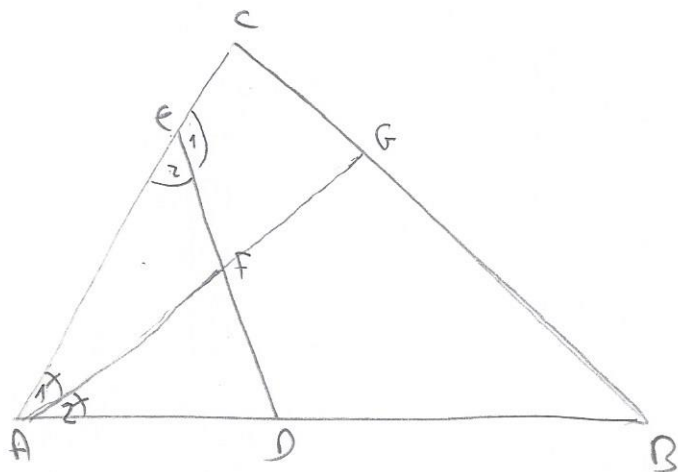
לבן וצובדים שם חכם השלם (הסרה האודות)
 גלפה



$$P(\text{רשמי, לבן באישי}) = 0.4^2 = \underline{\underline{0.16}}$$

4)

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1) $\angle B = \angle E$

נכון

2) $\angle E_1 + \angle B = 180^\circ$

(זכרי 1 + סכום זוויות סמוכות = 180°)

3) $\angle E_1 + \angle E_2 = 180^\circ$

(זכרי 1 - סכום)

4) $\angle E_2 = \angle B$

(

זכרי 2, 3 + זכרי 1)

5) $\angle A$

זכרי 1 - זכרי 1

6) $\triangle ADE \sim \triangle ABC$

זכרי 1

(

זכרי 4, 5 + זכרי 1, 2, 3)

7) $\frac{S_{\triangle ABC}}{S_{\triangle ADE}} = 4$

נכון

8) $\angle A_1 = \angle A_2$

נכון

9) $\triangle AEF \sim \triangle ABG$

זכרי 1

(

זכרי 4, 8 + זכרי 1, 2, 3)

10) $\frac{S_{\triangle ABC}}{S_{\triangle ADE}} = \left(\frac{AB}{AE}\right)^2$

(

זכרי 6 + זכרי 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)

11) $\left(\frac{AB}{AE}\right)^2 = 4$

(

זכרי 7, 10)

זכרי 1

$$\Rightarrow \frac{AB}{AE} = \pm 2 \Rightarrow \frac{AB}{AE} = 2 \quad \left(\frac{AB}{AE} > 0 \right)$$

$$12) \boxed{\frac{EF}{BG} = \frac{AG}{AB} = \frac{1}{2}}$$

2 נ' של

(2 נ' של 1, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)

$$13) \frac{GC}{BG} = \frac{AC}{AB} \quad ($$

(2 נ' של 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)

$$14) \frac{AD}{AE} = \frac{AC}{AB} \quad ($$

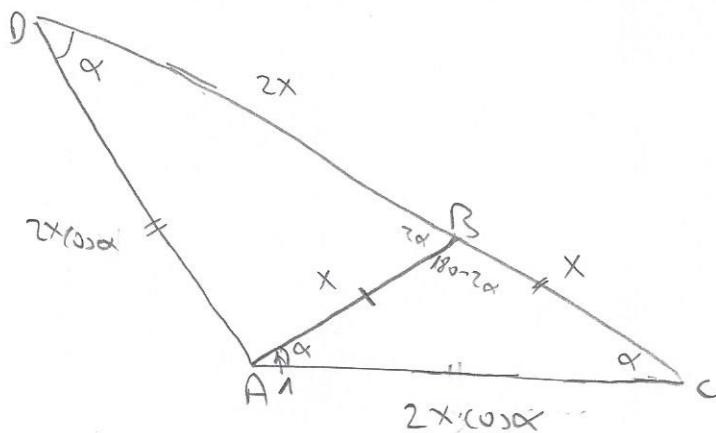
(2 נ' של 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)

$$15) \boxed{\frac{GC}{BG} = \frac{AD}{AE}} \quad ($$

(2 נ' של 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100)

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1) $AD = AC$

2) $AB = BC$

3) $DC = 3BC$

$\Rightarrow BC = AB = x$ (13*)

$\Rightarrow DC = 3x$

4) $\angle D = \angle C = \alpha$ (כ"ס שווה $\triangle ADC \sim \triangle ABC$ פ"ג + 1 כ"ס)

5) $\angle A_1 = \angle C = \alpha$ (כ"ס + 1 כ"ס
 $\triangle ABC \sim \triangle BDC$ פ"ג + 1 + 2 כ"ס)

6) $\angle ABC = 180 - 2\alpha$ (180° $\triangle ABC \sim \triangle BDC$ פ"ג + 5 כ"ס)

$\triangle ABC$

$$\frac{AC}{\sin(180-2\alpha)} = \frac{x}{\sin \alpha} \Rightarrow AC = \frac{x \cdot \sin 2\alpha}{\sin \alpha} = \frac{x \cdot 2 \sin \alpha \cdot \cos \alpha}{\sin \alpha}$$

$AC = AD = 2x \cdot \cos \alpha$

$\triangle ADC$

$$(2x \cos \alpha)^2 = (2x \cos \alpha)^2 + (3x)^2 - 2 \cdot 2x \cos \alpha \cdot 3x \cdot \cos \alpha$$

$$\Rightarrow 12x^2 \cos^2 \alpha = 9x^2 \quad / : 12x^2$$

$$\cos^2 \alpha = \frac{3}{4}$$

$\Rightarrow$

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$$\cos \alpha = \pm \frac{\sqrt{3}}{2}$$

$$\Rightarrow \cos \alpha = \frac{\sqrt{3}}{2}$$

$$\cos \alpha = -\frac{\sqrt{3}}{2}$$

$$\alpha = 30^\circ + 360^\circ k$$

$$\alpha = -30^\circ + 360^\circ k$$

$$\alpha = 150^\circ + 360^\circ k$$

$$\alpha = -150^\circ + 360^\circ k$$



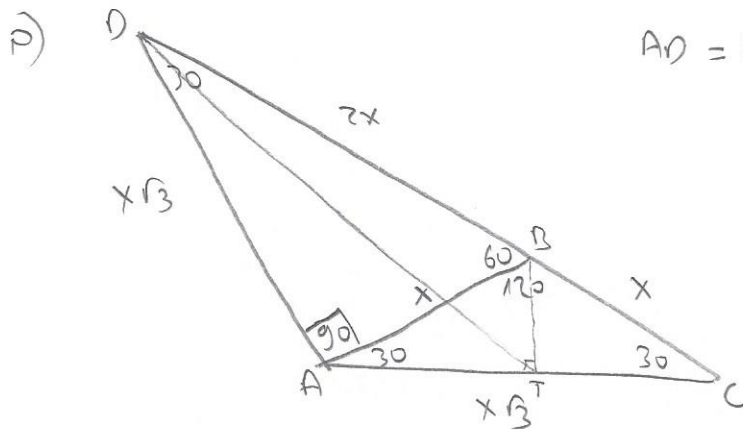
$$(\Delta \approx -15^\circ \alpha) \quad k=0$$

$$\Rightarrow \boxed{\alpha = 30^\circ}$$

$$\angle D = \angle C = 30^\circ$$

$$\angle A = 120^\circ$$

בתרגיל קחו את הנקודות של הנגדי סביר סיים
צו"ל - ב Δ 180° רשום סך של k



$$AD = AC = 2x \cdot \cos 30 = x\sqrt{3}$$

$$S_{\triangle ADC} = 16\sqrt{3}$$

$$\Rightarrow \frac{x \cdot \sqrt{3} \cdot 3x \cdot \sin 30}{2} = 16\sqrt{3}$$

$$\Rightarrow \boxed{x^2 = \frac{64}{3}}$$

$$BT = \frac{x}{2} \quad \left(\begin{array}{l} \triangle BTC \text{ סך של } 30, 60, 90 \\ \text{הנרוב של הנגדי סביר סיים} \end{array} \right)$$

$\triangle DBT$

$$\begin{aligned} DT^2 &= (2x)^2 + \left(\frac{x}{2}\right)^2 - 2 \cdot 2x \cdot \frac{x}{2} \cdot \cos 120 \\ &= 4x^2 + \frac{x^2}{4} + x^2 \end{aligned}$$

$$DT^2 = \frac{21}{4}x^2 = \frac{21}{4} \cdot \frac{64}{3} = 112$$

$$\boxed{DT = \sqrt{112} \text{ m}}$$

6) $f(x) = 2x + \frac{\cos x}{\sin x} \quad 0 \leq x \leq \pi$

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7) : $\sin x \neq 0$

$$\sin x \neq 0$$

$$x \neq \pi k$$

$$\begin{array}{l} k=0 \Rightarrow x \neq 0 \\ k=1 \Rightarrow x \neq \pi \end{array} \Rightarrow \boxed{0 < x < \pi}$$

7) (1) הנגזרת

$$\boxed{x=0, x=\pi}$$

$$(2) \hat{f}(x) = 2 + \frac{-\sin^2 x - \cos^2 x}{\sin^2 x} = 2 - \frac{\sin^2 x + \cos^2 x}{\sin^2 x}$$

$$\boxed{\hat{f}(x) = 2 - \frac{1}{\sin^2 x}}$$

$$\hat{f}(x) = 0 \Rightarrow 2 - \frac{1}{\sin^2 x} = 0 \Rightarrow \sin^2 x = \frac{1}{2}$$

$$\sin x = \frac{\sqrt{2}}{2}$$

$$\boxed{x = \frac{\pi}{4} + 2\pi k}$$

$$\boxed{x = \frac{3\pi}{4} + 2\pi k}$$

$$\sin x = -\frac{\sqrt{2}}{2}$$

$$\boxed{x = -\frac{\pi}{4} + 2\pi k}$$

$$\boxed{x = \frac{5\pi}{4} + 2\pi k}$$

$$k=0$$

$$x = \frac{\pi}{4}$$

$$x = \frac{3\pi}{4}$$

$$x = -\frac{\pi}{4} \notin$$

$$x = \frac{5\pi}{4} \notin$$

$$k=1$$

$$\emptyset$$

$$\emptyset$$

$$\emptyset$$

$$\emptyset$$

$$f\left(\frac{\pi}{4}\right) = \frac{\pi}{2} + 1 \Rightarrow \left(\frac{\pi}{4}, \frac{\pi}{2} + 1\right)$$

$$f\left(\frac{3\pi}{4}\right) = \frac{3\pi}{2} - 1 \Rightarrow \left(\frac{3\pi}{4}, \frac{3\pi}{2} - 1\right)$$

←

Handwritten notes on the left: $\rightarrow$ (diagonal lines) $\rightarrow$ (diagonal lines) $\rightarrow$ (diagonal lines)

x	0	$0 < x < \frac{\pi}{4}$	$\frac{\pi}{4}$	$\frac{\pi}{2} < x < \frac{3\pi}{4}$	$\frac{3\pi}{4}$	$\frac{3\pi}{4} < x < \pi$	π
f'		$x = \frac{\pi}{6}$ -		$x = \frac{\pi}{2}$ +		$x = \frac{5\pi}{6}$ -	
f		$\searrow$	$\frac{\pi}{4}$	$\nearrow$	$\frac{3\pi}{4}$	$\searrow$	

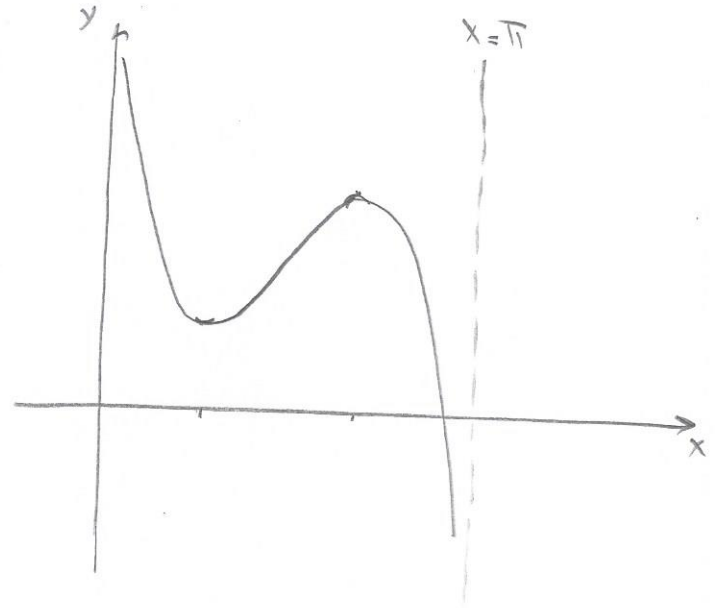
$$f'(\frac{\pi}{6}) = 2 - \frac{1}{\sin^2 \frac{\pi}{6}} = -2 < 0$$

$$f'(\frac{\pi}{2}) = 2 - \frac{1}{\sin^2 \frac{\pi}{2}} = 1 > 0$$

$$f'(\frac{5\pi}{6}) = 2 - \frac{1}{\sin^2 \frac{5\pi}{6}} = -2$$

$$\Rightarrow \begin{aligned} &\min(\frac{\pi}{4}, \frac{\pi}{2} + 1) \\ &\max(\frac{3\pi}{4}, \frac{3\pi}{2} - 1) \end{aligned}$$

(3)



$\rightarrow$ (diagonal lines)

7)

$$g(x) = 2 - \frac{1}{\sin^2 x}$$

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$$g'(x) = \frac{2 \sin x \cdot (\cos x)}{\sin^4 x} = \frac{\sin 2x}{\sin^3 x}$$

$$g'(x) = 0 \Rightarrow \sin 2x = 0$$

$$2x = \pi k \quad / : 2$$

$$x = \frac{\pi}{2} k$$

$$k=0 \Rightarrow x=0 \quad \emptyset \leftarrow \text{פונקציה } k \text{ לא נכנסת}$$

$$k=1 \Rightarrow x = \frac{\pi}{2}$$

$$k=2 \Rightarrow x = \pi \quad \emptyset \leftarrow$$

x	$x = \frac{4\pi}{9}$	$\frac{\pi}{2}$	$x = \frac{5\pi}{9}$
g'	+		-
g			

$$g'\left(\frac{4\pi}{9}\right) = \frac{\sin \frac{8\pi}{9}}{\sin^3\left(\frac{4\pi}{9}\right)} = (+)$$

$$g'\left(\frac{5\pi}{9}\right) = \frac{\sin \frac{10\pi}{9}}{\sin^3\left(\frac{5\pi}{9}\right)} = (-)$$

$$\max \quad x = \frac{\pi}{2}$$

$$g\left(\frac{\pi}{2}\right) = 2 - \frac{1}{\sin^2 \frac{\pi}{2}} = 1 \leftarrow$$

1000
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$$\Rightarrow m = 1 = \tan \alpha \Rightarrow \boxed{\alpha = 45^\circ}$$

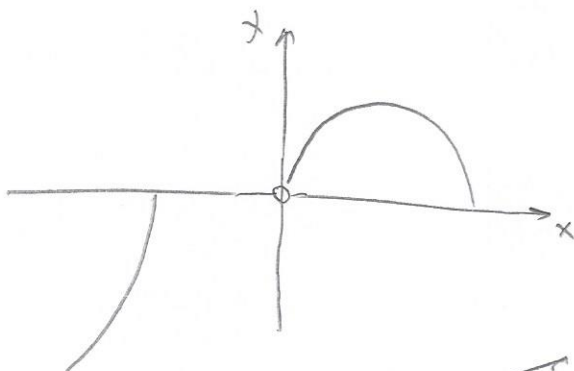
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$$f(x) = \frac{\sqrt{12x^3 - x^5}}{x}$$

$$x \leq -2\sqrt{3}$$

$$0 < x \leq 2\sqrt{3}$$

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$$f'(x) = \frac{\frac{36x^2 - 5x^4}{2\sqrt{12x^3 - x^5}} \cdot x - \sqrt{12x^3 - x^5}}{x^2} = \frac{36x^3 - 5x^5 - 2(12x^3 - x^5)}{2\sqrt{12x^3 - x^5} \cdot x^2}$$

$$\tilde{f}(x) = \frac{12x^3 - 3x^5}{2x^2 \sqrt{12x^3 - x^5}}$$

$$\tilde{f}(x) = 0 \Rightarrow 12x^3 - 3x^5 = 0 \Rightarrow 3x^3(4 - x^2) = 0$$

$$x_1 = 0 \quad \text{פ' (0,0)}$$

$$4 - x^2 = 0$$

$$x_1 = 2 \Rightarrow f(2) = 4 \Rightarrow (2, 4)$$

$$x_2 = -2 \quad \text{פ' (-2, -4)}$$

x	$x < -2\sqrt{3}$	$-2\sqrt{3}$	0	$0 < x < 2$	2	$2 < x < 2\sqrt{3}$	$2\sqrt{3}$
יחס	$x = -4$			$x = 1$		$x = 3$	
+	+			+		-	
↑	↑			↑		↓	

הפונקציה היא חיובית עבור x בין $-2\sqrt{3}$ ל-2, ושלילית עבור x בין 2 ל- $2\sqrt{3}$.
המקסימום הוא ב- $(2, 4)$.

$$\tilde{f}(-4) = \frac{7304}{14} = 521.71$$

$$\tilde{f}(4) = \frac{9}{14} = 0.64$$

$$\tilde{f}(3) = \frac{-405}{14} = -28.93$$

$$\Rightarrow \max(2, 4)$$

לפי

הערך $y=k$ חותך את הפונקציה ב-2 נקודות

בדיון

$$0 \leq k < 4$$

2) (1) $g(x) = \sqrt{12x - x^3}$

$x \leq -2\sqrt{3}$

$0 \leq x \leq 2\sqrt{3}$

$$f(x) = \frac{\sqrt{12x^3 - x^5}}{x} = \frac{|x| \cdot \sqrt{12x - x^3}}{x}$$

$\Rightarrow x \leq -2\sqrt{3}$

$0 < x \leq 2\sqrt{3}$

$f(x) = -\sqrt{12x - x^3}$

$f(x) = \sqrt{12x - x^3}$

⇓

יש פירוש אחר של $g(x)$ בנקודה x בה x ברזום הידועה

$\Rightarrow x \leq -2\sqrt{3}$

$0 < x \leq 2\sqrt{3}$

$g(x) = -f(x)$

$g(x) = f(x)$

⇓

$x < -2\sqrt{3}$

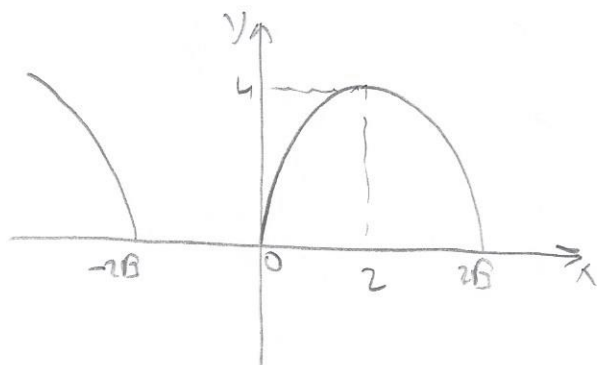
הפונקציה

$2 < x < 2\sqrt{3}$

$0 < x < 2$

הפונקציה

(2)



(3)

$0 \leq k < 4 \Rightarrow$

הערך $y=k$ חותך את הפונקציה ב-3 נקודות

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$$f(x) = x^2 - 6x + 5$$

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$$f(x) = 0 \Rightarrow x^2 - 6x + 5 = 0$$

$$x_1 = 5$$

$$x_2 = 1$$

$$f'(x) = 2x - 6$$

$$f'(5) = 4 > 0 \Rightarrow \min x = 5$$

$$f'(1) = -4 < 0 \Rightarrow \max x = 1$$

710 f(x) 1000 for y = 10² 100
100 71 1000

$$\max(1, 10^{\frac{2}{3}})$$

$$F(x) = \int (x^2 - 6x + 5) dx = \frac{x^3}{3} - 3x^2 + 5x + C$$

$$F(1) = 10^{\frac{2}{3}} \Rightarrow \frac{1}{3} - 3 + 5 + C = 10^{\frac{2}{3}} \Rightarrow C = 8\frac{1}{3}$$

$$F(x) = \frac{x^3}{3} - 3x^2 + 5x + 8\frac{1}{3}$$

$$F(5) = 0 \Rightarrow \min(5, 0)$$

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←

א) $g(x) = \hat{f}(x)$ נחין

$g(x)$

$\max(1, 11\frac{2}{3})$

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$\max(1, 9\frac{2}{3})$

$\Downarrow$

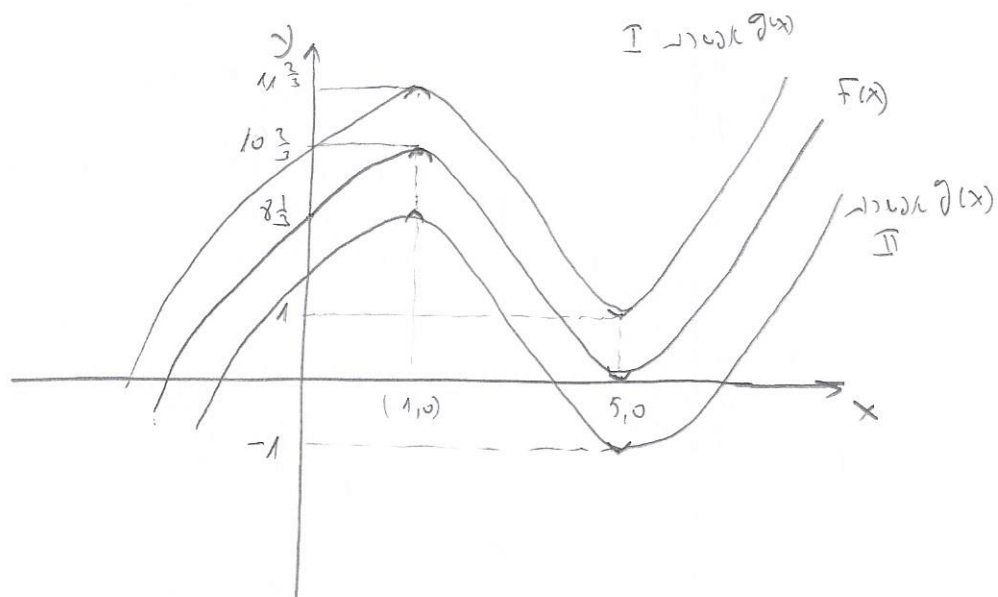
$\Downarrow$

$\min(5, 1)$

$1/6$

$\min(5, -1)$

ב) 1)



(2) $F(x)$ — נק' חזיון עם היריבה x

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