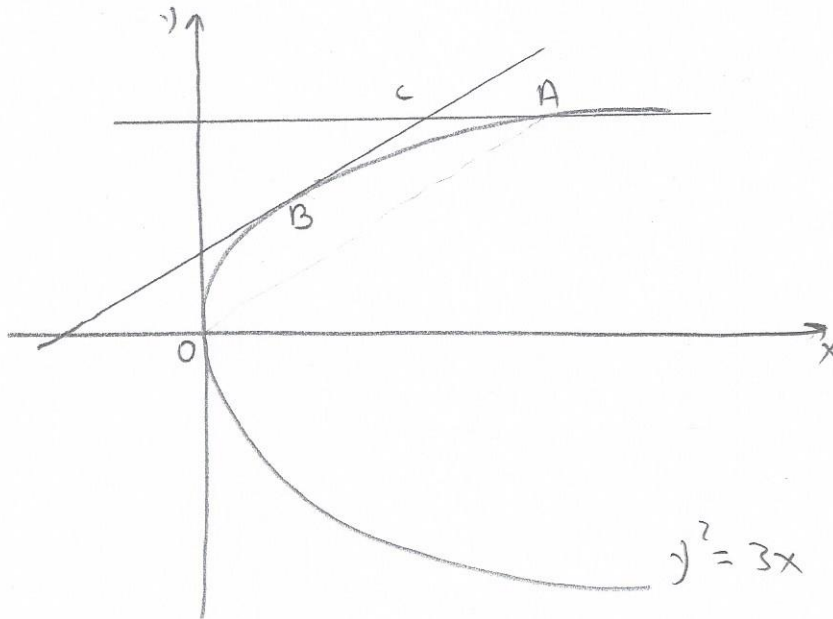


1



נקודה C

נקודה C נקודה A
הנקודה C נקודה A
הנקודה C נקודה A

$$\begin{cases} x = x_c \\ y^2 = 4x \end{cases} \Rightarrow y = \pm 2\sqrt{x_c}$$

נקודה C נקודה A נקודה B

$$C(x_c, 2\sqrt{x_c})$$

נקודה A

$$A(x_A, \sqrt{3x_A})$$

נקודה A הנקודה A
נקודה A הנקודה A
נקודה A הנקודה A

ל) $A(x_A, y_A)$ נקודה A (נקודה)

$$\Rightarrow y_A = y_c$$

$$\Rightarrow \sqrt{3x_A} = 2\sqrt{x_c} \quad \uparrow^2$$

$$3x_A = 4x_c$$

$$x_A = \frac{4}{3}x_c$$

הנקודה A

נקודה A

$$\Rightarrow A\left(\frac{4}{3}x_c, 2\sqrt{x_c}\right)$$

$$m_{OA} = \frac{2\sqrt{x_c} - 0}{\frac{4}{3}x_c - 0} = \frac{3\sqrt{x_c}}{x_c} = \frac{3\sqrt{x_c}}{2\sqrt{x_c} \cdot \sqrt{x_c}}$$

$$m_{OA} = \frac{3}{2\sqrt{x_c}}$$

$$\stackrel{?}{=} \frac{1}{2}$$

c)

$$\frac{\text{הצגה של } x \text{ ו- } y}{\text{הצגה של } x \text{ ו- } y}$$

הצגה של x ו- y

$$2y \cdot y = 3$$

$$\Rightarrow \boxed{y = \frac{3}{2y}}$$

$$AO \parallel BC$$

$$\Rightarrow m_{AO} = m_{BC}$$

$$\Rightarrow \frac{3}{2\sqrt{x_c}} = \frac{3}{2y_B}$$

$$\Rightarrow y_B = \sqrt{x_c}$$

$$S_{\triangle ABC} = 0.5625$$

$$\Rightarrow \frac{(x_A - x_c)(y_c - y_B)}{2} = \frac{\left(\frac{4}{3}x_c - x_c\right)(2\sqrt{x_c} - \sqrt{x_c})}{2} = 0.5625$$

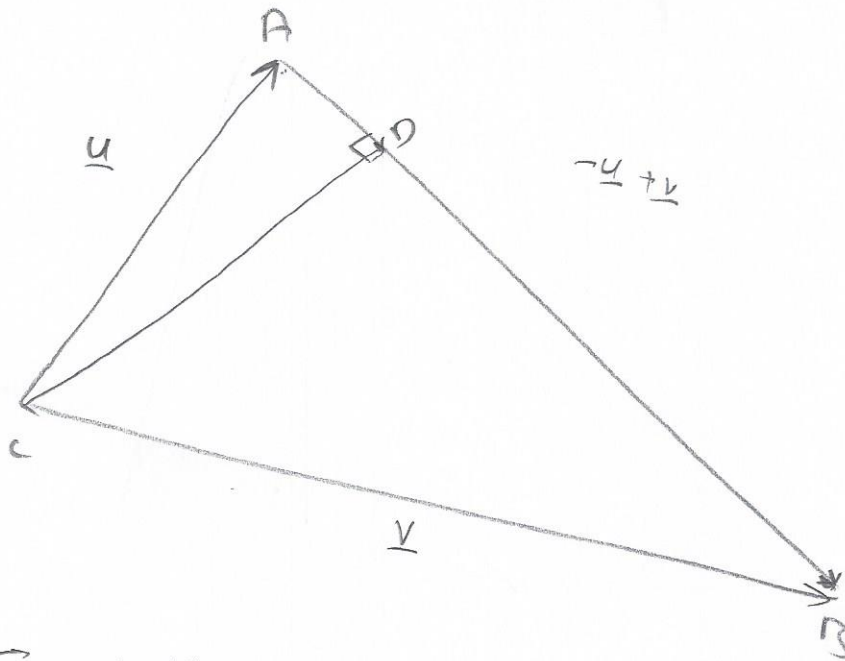
$$\frac{\frac{1}{3}x_c \cdot \sqrt{x_c}}{2} = 0.5625$$

$$x_c \sqrt{x_c} = \frac{72}{8} \quad \uparrow^2$$

$$x_c^3 = \frac{72}{64}$$

$$x_c = \frac{9}{4} \Rightarrow \boxed{C\left(\frac{9}{4}, 3\right)}$$

(2)

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$$10) \quad \vec{AB} = -\underline{u} + \underline{v}$$

$$\vec{AD} = t \vec{AB} = -t\underline{u} + t\underline{v}$$

$$\vec{CD} = \underline{u} + \vec{AD} = (1-t)\underline{u} + t\underline{v}$$

$$|\underline{v}| = 2 \Rightarrow \underline{v}^2 = 4$$

$$|\underline{u}| = 1 \Rightarrow \underline{u}^2 = 1$$

$$\cos \angle ACB = \frac{3}{4} \Rightarrow \underline{u} \cdot \underline{v} = |\underline{u}| \cdot |\underline{v}| \cdot \cos \angle ACB = 1 \cdot 2 \cdot \frac{3}{4}$$

$$\underline{u} \cdot \underline{v} = 1.5$$

$$\vec{CD} \perp \vec{AB}$$

$$\Rightarrow \vec{CD} \cdot \vec{AB} = 0$$

$$\Rightarrow [(1-t)\underline{u} + t\underline{v}] [-\underline{u} + \underline{v}] = 0$$

$$-(1-t)\underline{u}^2 - t\underline{u} \cdot \underline{v} + (1-t)\underline{u} \cdot \underline{v} + t\underline{v}^2 = 0$$

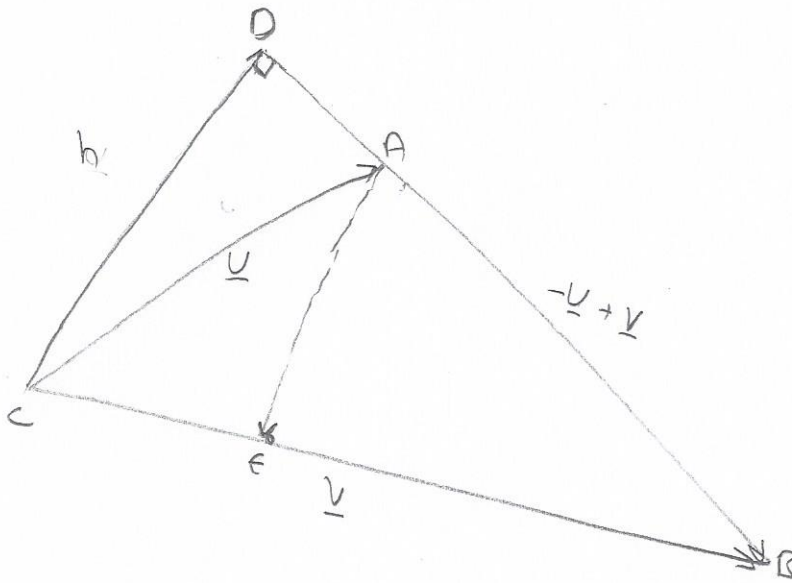
$$t - 1 - 1.5t - 1.5t + 1.5 + 4t = 0$$

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

1/4 p.1

1 cm
←

2)



$$c) \frac{CE}{CB} = \frac{3}{5} \Rightarrow \vec{CE} = \frac{3}{5} \underline{v}$$

$$\vec{EB} = \frac{2}{5} \underline{v}$$

$$\vec{CD} = \underline{h}$$

$$\vec{CD} = \frac{5}{4} \underline{u} - \frac{1}{4} \underline{v} = \underline{h} \quad (\vec{CD} \approx \text{tangent to circle})$$

$$\vec{AE} = -\underline{u} + \frac{3}{5} \underline{v}$$

$$\underline{h} = \frac{5}{4} \underline{u} - \frac{1}{4} \underline{v} \quad | \cdot 4$$

$$4\underline{h} = 5\underline{u} - \underline{v} \Rightarrow \boxed{\underline{v} = 5\underline{u} - 4\underline{h}}$$

$$\vec{AE} = -\underline{u} + \frac{3}{5} \cdot (5\underline{u} - 4\underline{h})$$

$$\boxed{\vec{AE} = \frac{7}{5} \underline{u} - \frac{12}{5} \underline{h}}$$

(3) b) $\left(\frac{z+1}{z-1}\right)^4 = 1$

$\frac{z+1}{z-1} = \text{cis } \frac{2\pi k}{4} \leftarrow \begin{matrix} \text{arg. val. of} \\ \text{4 roots} \end{matrix}$

$\frac{z+1}{z-1} = \text{cis } \frac{\pi}{2} k$

$k=0 \quad \frac{z+1}{z-1} = \text{cis } 0 = 1$

$\Rightarrow z+1 = z-1$

$\boxed{z_0 = -2}$

$k=1 \quad \frac{z+1}{z-1} = \text{cis } 90 = i$

$\Rightarrow z+1 = z i - 1$

$z - z i = -1 - 1$

$z = \frac{(-1-i)(z+1)}{(z-i)(z+i)} = \frac{-2-i-zi+1}{5} = \boxed{-\frac{1}{5} - \frac{3}{5}i = z_1}$

$k=2 \quad \frac{z+1}{z-1} = \text{cis } \pi = -1$

$z+1 = -z+1$

$\boxed{z_2 = 0}$

$k=3 \quad \frac{z+1}{z-1} = \text{cis } \frac{3\pi}{2} = -i$

$\frac{z+1}{z-1} = -i \Rightarrow z+1 = -i z + i$

$z + i z = -1 + i$

$z = \frac{(-1+i)(z-i)}{(z+i)(z-i)} = \frac{-2+i+zi+1}{5} \Rightarrow \boxed{z_3 = -\frac{1}{5} + \frac{3}{5}i}$

14/3 $\leftarrow$

$$7) \quad z_0 = -2 = 2 \operatorname{cis} 180$$

$$z_1 = -\frac{1}{5} - \frac{3}{5}i = \frac{\sqrt{10}}{5} \operatorname{cis} 251.56^\circ$$

$$z_2 = -\frac{1}{5} + \frac{3}{5}i = \frac{\sqrt{10}}{5} \operatorname{cis} 108.43^\circ$$

הזווית היא 108.43°

$$\underline{108.43^\circ < \arg < 251.56^\circ}$$

4) $f(x) = \frac{-2(x+3)}{\sqrt{e^{ax}}}$

ב) (1) : נגזרת

$e^{ax} > 0$ x גר

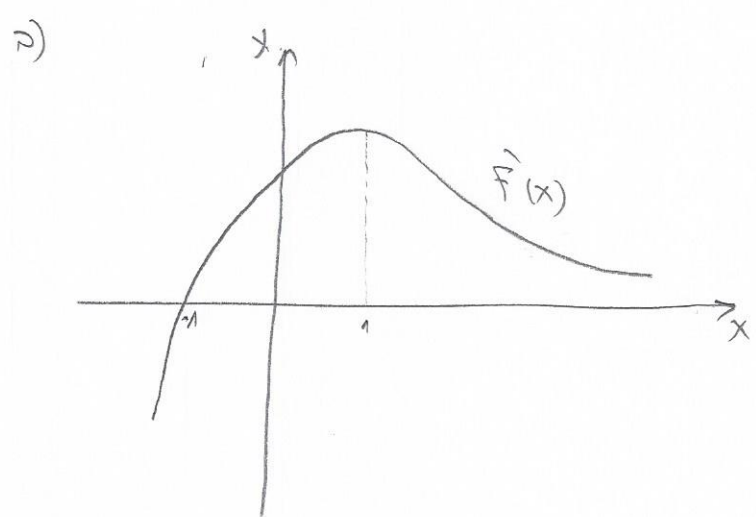
(2) x גר של f

$y=0 \Rightarrow -2(x+3)=0$

$x=-3 \Rightarrow \boxed{(-3, 0)}$

y גר של f

$x=0 \Rightarrow f(0) = \frac{-6}{\sqrt{1}} = -6 \Rightarrow \boxed{(0, -6)}$



	x	$x < -1$	-1	$x > -1$
הנגזרת של f	$f' > 0$	-	0	+
הנגזרת של f	$f' < 0$			

↘
min
↗

$\min x = -1$

←

$$\hat{f}(-1) = 0$$

$$\hat{f}(x) = \frac{-7 \cdot \sqrt{e^{ax}} + 2(x+3) \cdot \frac{ae^{ax}}{2\sqrt{e^{ax}}}}{e^{ax}} = \frac{-4e^{ax} + 2ae^{ax}(x+3)}{e^{ax}}$$

$$\hat{f}(x) = \frac{2ax \cdot e^{ax} + 6ae^{ax} - 4e^{ax}}{2e^{ax} \cdot \sqrt{e^{ax}}}$$

$$\hat{f}(-1) = 0 \Rightarrow -2a \cdot e^{-a} + 6a \cdot e^{-a} - 4e^{-a} = 0 \quad / : e^{-a} > 0$$

$$-2a + 6a - 4 = 0$$

$$\boxed{a=1}$$

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

$$\hat{f}(x) = \frac{2x \cdot e^x + 2e^x}{2e^x \cdot \sqrt{e^x}}$$

$$f(-1) = \frac{-4}{\sqrt{e^{-1}}} = -4\sqrt{e}$$

$$\Rightarrow \boxed{\min(-1, -4\sqrt{e})}$$

1) ב' נ"ל

$\hat{f}(x) = 0 \leftarrow$ נקודת הקיצון של $f(x)$
 הא נקודת המזון של $f(x)$
 $f(x)$ של $\hat{f}(x)$ ושל $f(x)$

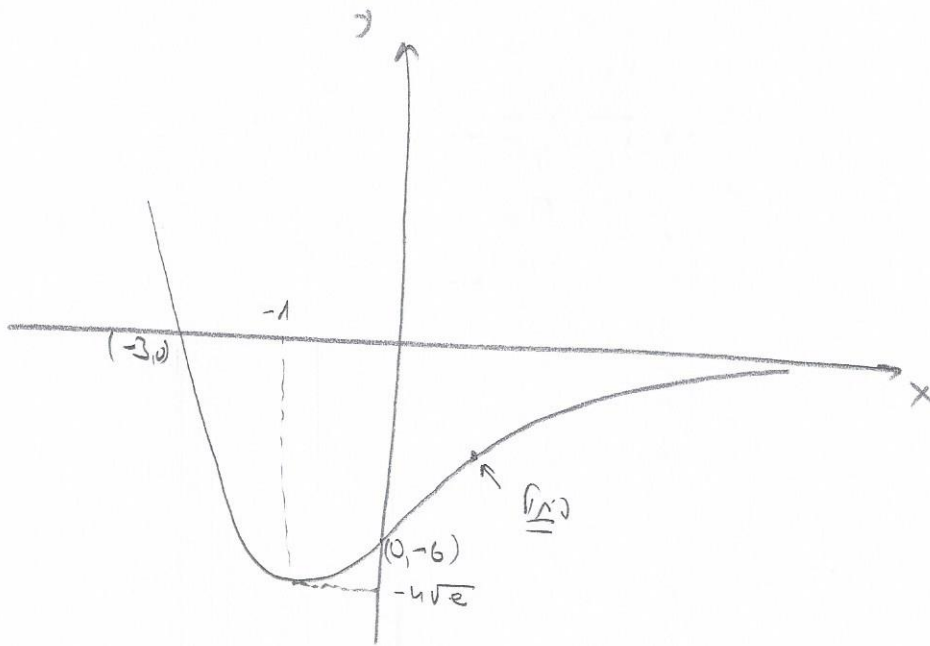
$$f(1) = \frac{-8}{\sqrt{e}} \Rightarrow \boxed{(1, -\frac{8}{\sqrt{e}}) \text{ נ"ל}}$$

3)

x	x < 1	1	x > 1
$\hat{f}(x) \rightarrow y''$	+		-
$f'(x) \rightarrow y'$	↗		↘
$f(x) \rightarrow y$	∪	⊖	∩

for $x < -1$	decreasing
for $x > -1$	increasing

1)



5

$$F(x) = \frac{3 - 9 \ln(3x+1)}{3x+1}$$

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1) הגדרת הפונקציה

$$3x+1 > 0$$

$$x > -\frac{1}{3}$$

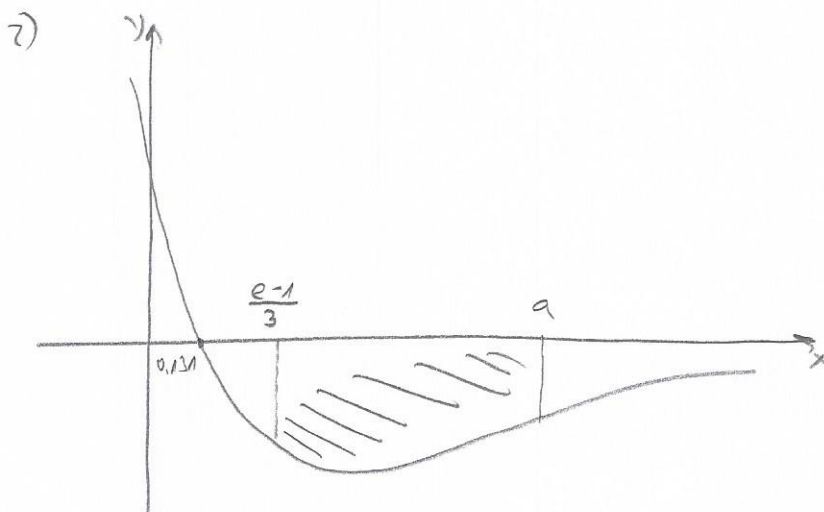
2) (1) הפונקציה היא

$$y=0 \Rightarrow 3 - 9 \ln(3x+1) = 0$$

$$\ln(3x+1) = \frac{1}{3}$$

$$3x+1 = e^{\frac{1}{3}} \Rightarrow x = \frac{e^{\frac{1}{3}} - 1}{3} = 0.131$$

$$\Rightarrow (0.131, 0)$$



$$y = \ln^2(3x+1) \Rightarrow y' = 2 \cdot \ln(3x+1) \cdot \frac{1}{3x+1} \cdot 3$$

$$y' = \frac{6 \cdot \ln(3x+1)}{3x+1}$$

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←

$$S = \int_{\frac{e-1}{3}}^a \left[0 - \frac{3 - 9 \ln(3x+1)}{3x+1} \right] dx$$

$$= \int_{\frac{e-1}{3}}^a \left[\frac{9 \ln(3x+1)}{3x+1} - \frac{3}{3x+1} \right] dx = \int_{\frac{e-1}{3}}^a \left[1.5 \cdot \frac{6 \ln(3x+1)}{3x+1} - \frac{3}{3x+1} \right] dx$$

$$= \left[1.5 \cdot \ln^2(3x+1) - \ln(3x+1) \right]_{\frac{e-1}{3}}^a$$

$$= 1.5 \cdot \ln^2(3a+1) - \ln(3a+1) - \left[1.5 \cdot \ln^2 e - \ln e \right]$$

$$= \frac{3}{2} \cdot \ln^2(3a+1) - \ln(3a+1) - \frac{1}{2} = \frac{7}{2} \leftarrow \left(\begin{array}{l} \text{alle nenne } 1.5 \\ 3.5 \end{array} \right)$$

$$3 \ln^2(3a+1) - 2 \ln(3a+1) - 1 = 7$$

$$\ln(3a+1) = t$$

$$3t^2 - 2t - 8 = 0$$

$$t_1 = 2 \Rightarrow \ln(3a+1) = 2 \Rightarrow 3a+1 = e^2 \Rightarrow \boxed{a = \frac{e^2 - 1}{3}}$$

$$t_2 = -\frac{4}{3} \Rightarrow \ln(3a+1) = -\frac{4}{3} \Rightarrow 3a+1 = e^{-\frac{4}{3}} \Rightarrow a = \frac{e^{-\frac{4}{3}} - 1}{3} \quad \phi$$

$$(a > \frac{e-1}{3})$$

e)

Für $x > \frac{e^{\frac{1}{3}} - 1}{3}$ gilt

$$x > \frac{e^{\frac{1}{3}} - 1}{3}$$

$$\min x = \frac{e^{\frac{1}{3}} - 1}{3} \quad \text{also } \phi$$

$$\Rightarrow f(x) < 0$$

$$x < \frac{e^{\frac{1}{3}} - 1}{3}$$

- für $x > \frac{e^{\frac{1}{3}} - 1}{3}$ gilt $f(x) < 0$

$$\boxed{\frac{e^{\frac{1}{3}} - 1}{3} < x < \frac{e^{\frac{1}{3}} - 1}{3}}$$