

1

סדרה הנדסית אן טיפוס

סדרה I - הנדסית אן טיפוס

$$a_1, a_2, a_3, \dots, a_n, \dots$$

$$q = r$$

סדרה II - הנדסית אן טיפוס

$$b_1, b_2, b_3, \dots, b_n, \dots$$

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

סדרה III - הנדסית אן טיפוס

$$\frac{a_1}{b_1}, \frac{a_2}{b_2}, \frac{a_3}{b_3}, \dots, \frac{a_n}{b_n}, \dots$$

$$q_{III} = \frac{\frac{a_2}{b_2}}{\frac{a_1}{b_1}} = \frac{\frac{a_1 q}{b_1 \cdot \frac{1}{2}}}{\frac{a_1}{b_1}} = \frac{2q}{\frac{1}{2}} = 4q$$

$$b) \quad II \text{ סדרה } S = 8 \Rightarrow \frac{b_1}{1 - \frac{1}{2}} = 8 \Rightarrow \boxed{b_1 = 4}$$

$$I \text{ סדרה } S = 2 \cdot S_{III}$$

$$\Rightarrow \frac{a_1}{1 - q} = \frac{2 \cdot \frac{a_1}{b_1}}{1 - 2q} \Rightarrow \frac{a_1}{1 - q} = \frac{2a_1}{4(1 - 2q)} \quad / : a_1 \neq 0$$

$$\frac{1}{1 - q} = \frac{2}{4(1 - 2q)}$$

$$\Rightarrow 4 - 8q = 2 - 2q$$

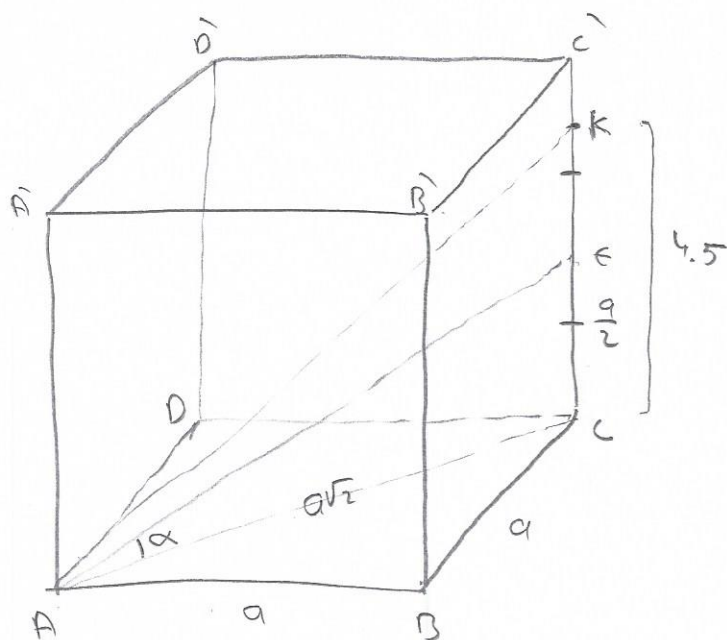
$$6q = 2$$

$$\boxed{q = \frac{1}{3}}$$

$\Rightarrow$

$$\boxed{q_{III} = \frac{2}{3}}$$

2)



מחין: קוביה

805 705 f7  
1/2 701N

ד)  $CE = EC'$  | מחין

ה'ס'ן א'ע א'כ'ס' ABCD ה'ס'ן א'ע א'כ'ס'ן  
ה'ס'ן (AE) ה'ס'ן (AC) ה'ס'ן א'ע א'כ'ס'ן  
א'כ'ס'ן א'ע א'כ'ס'ן א'ע א'כ'ס'ן

$\Delta ABC$

$$AC = \sqrt{a^2 + a^2} = a \cdot \sqrt{2} \quad \text{א'כ'ס'ן א'ע א'כ'ס'ן}$$

$$CE = EC' = \frac{a}{2}$$

$\Delta AEC$

$$\frac{\frac{a}{2}}{a\sqrt{2}} = \tan \alpha \Rightarrow \boxed{\alpha = 19.47^\circ}$$

א'כ'ס'ן א'ע א'כ'ס'ן

ז)  $V = 160.608 \text{ m}^3 \Rightarrow a^3 = 160.608 \Rightarrow \boxed{a = 5.2 \text{ m}}$

$\Delta AEC$

$$AE = \sqrt{2a^2 + \frac{a^2}{4}} = \sqrt{2 \cdot 5.2^2 + \frac{5.2^2}{4}} = \underline{\underline{7.8 \text{ m}}}$$

ח)  $AC = a\sqrt{2} = 5.2 \cdot \sqrt{2}$

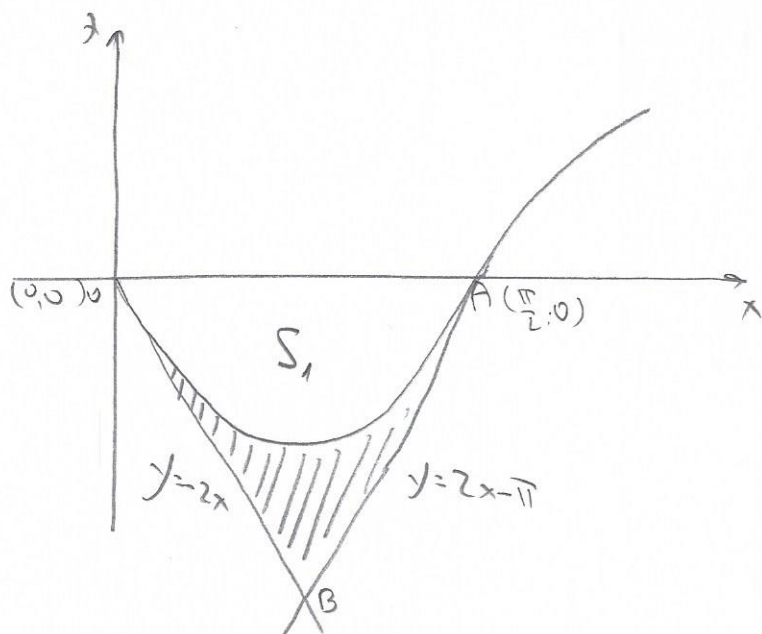
$\Delta KAC$

$$\frac{4.5}{5.2 \cdot \sqrt{2}} = \tan \angle KAC \Rightarrow \boxed{\angle KAC = 31.46^\circ}$$

$$\Rightarrow \angle KAE = \angle KAC - \angle EAC = 31.46^\circ - 19.47^\circ \approx \underline{\underline{12^\circ}}$$

③

705 2015 17  
7814



$$f(x) = -\sin 2x \quad 0 \leq x \leq \frac{3\pi}{4}$$

6)  $x \rightarrow 0, \pi \rightarrow \text{points}$

$$y=0 \Rightarrow -\sin 2x=0 \quad \therefore \sin 2x=0$$

$$2x = \pi k$$

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

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

$$k=1 \Rightarrow x=\frac{\pi}{2} \Rightarrow \boxed{(\frac{\pi}{2}, 0)}$$

$$\boxed{\hat{F}(x) = -2(0)2x}$$

$$\hat{F}(0) = -2$$

$$\hat{F}(\frac{\pi}{2}) = 2$$

OB line

$$m = -2, (0,0)$$

$$\boxed{y = -2x}$$

AB line

$$m = 2 \quad A(\frac{\pi}{2}, 0)$$

$$\boxed{y = 2x - \pi}$$

10/17

2)

$$\begin{matrix} B & \gamma \\ \hline \end{matrix}$$

$$\begin{cases} \gamma = -2x \\ \gamma = 2x - \pi \end{cases} \Rightarrow 2x - \pi = -2x \Rightarrow x = \frac{\pi}{4}; \gamma = -\frac{\pi}{2}$$

$$\boxed{B\left(\frac{\pi}{4}, -\frac{\pi}{2}\right)}$$

$$S_1 = \int_0^{\frac{\pi}{2}} \sin 2x dx = \left[ -\frac{\cos 2x}{2} \right]_0^{\frac{\pi}{2}} = \frac{1}{2} - \left( -\frac{1}{2} \right) = \underline{\underline{1}}$$

$$S_{\Delta OBA} = \frac{(x_A - x_0) \cdot \gamma_B}{2} = \frac{\frac{\pi}{2} \cdot \frac{\pi}{2}}{2} = \frac{\pi^2}{8}$$

$$\boxed{\text{итого } S = \frac{\pi^2}{8} - 1 = 0.233}$$

(4)  $f(x) = \frac{e^{2x}}{2x^2}$

805 2015 13  
12 2814

k) (1)

הנגזרת

$2x^2 \neq 0$

$x \neq 0$

(2)

הנגזרת

$2x^2 = 0 \Rightarrow x = 0$

2) (1)  $f'(x) = \frac{2 \cdot e^{2x} \cdot 2x^2 - 4x \cdot e^{2x}}{4x^4}$

$f'(x) = \frac{e^{2x}(4x^2 - 4x)}{4x^4}$

$f'(x) = 0 \Rightarrow e^{2x} > 0 \Rightarrow 4x^2 - 4x = 0$

$4x(x-1) = 0$

$x_1 = 0$  (כאן)  $\neq$  הנקודה

$x = 1 \Rightarrow f(1) = \frac{e^2}{2} \Rightarrow (1, \frac{e^2}{2})$

| x        | x < 0 | 0 | 0 < x < 1 | 1 | x > 1 |
|----------|-------|---|-----------|---|-------|
| הנגזרת   | +     | 0 | -         | 0 | +     |
| הפונקציה | ↗     |   | ↘         |   | ↗     |

הנגזרת  $4x^2 - 4x$  היא פולינום של  $x$  ויש לו שתי נקודות אפס:  $x = 0$  ו- $x = 1$ .  
 {  $x < 0$  :  $4x^2 - 4x > 0$  ;  $0 < x < 1$  :  $4x^2 - 4x < 0$  ;  $x > 1$  :  $4x^2 - 4x > 0$  }

$f'(-1) = \frac{(+)(4+4)}{+} = +$

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

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

$x > 1$  ;  $x < 0$  :  $f'$  חיובי  
 $0 < x < 1$  :  $f'$  שלילי

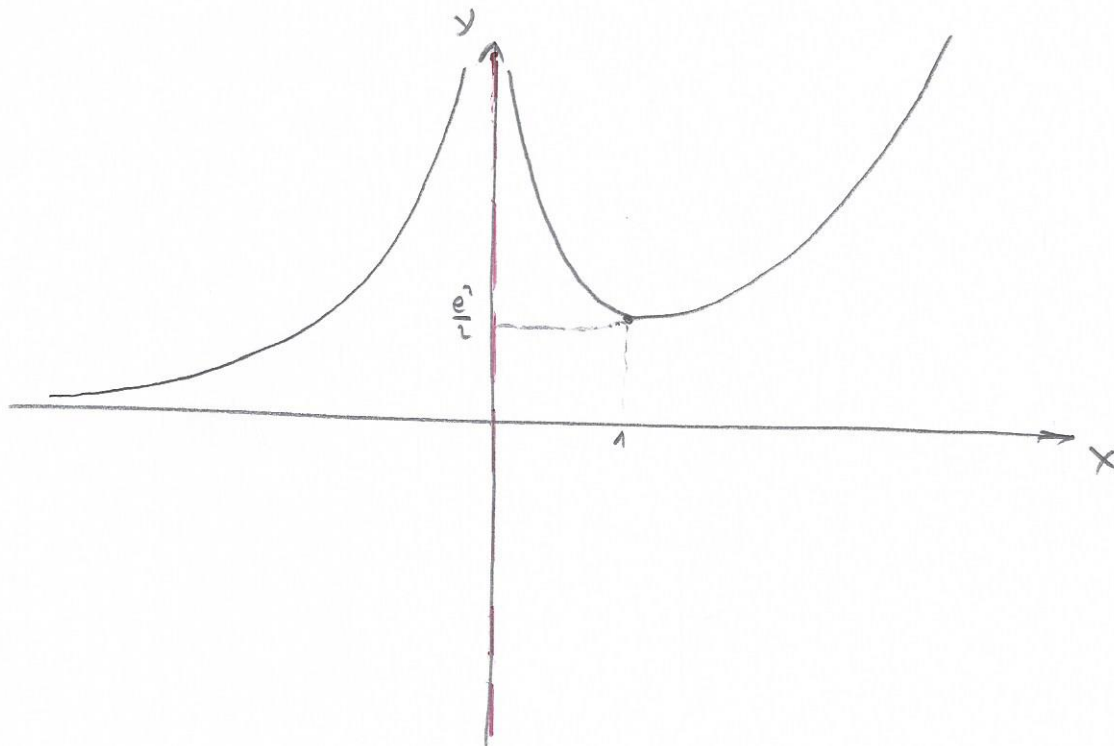
12)  $\frac{x}{e^{2x}}$

$y=0 \Rightarrow e^{2x}=0 \quad \text{for } x \quad e^{2x} > 0$

$\frac{x}{e^{2x}}$

$x=0 \quad \text{for } x \quad e^{2x} > 0$

(7)



ע)  $\frac{x}{e^{2x}}$  is a function

that is not a function

(I) is a function

(5)  $F(x) = x^2 \cdot (\ln x)^2$

805 2015 f7  
12 381N

(6) מ. נ. א. נ. א. נ. א.

$x > 0$

2)  $\hat{F}(x) = 2x \cdot (\ln x)^2 + x^2 \cdot 2 \cdot \ln x \cdot \frac{1}{x}$   
 $= 2x(\ln x)^2 + 2x \ln x$

$\hat{F}(x) = 2x \ln x (\ln x + 1)$

$\hat{F}(x) = 0 \Rightarrow 2x \ln x (\ln x + 1) = 0$

$x_1 = 0 \notin (0, \infty)$   
מימיו

$\ln x = 0 \Rightarrow x = 1 \Rightarrow F(1) = 0 \Rightarrow (1, 0)$

$\ln x = 1 \Rightarrow x = e \Rightarrow f\left(\frac{1}{e}\right) = \frac{1}{e^2} \Rightarrow \left(\frac{1}{e}, \frac{1}{e^2}\right)$

| x                          | 0 | $0 < x < \frac{1}{e}$  | $\frac{1}{e}$ | $\frac{1}{e} < x < 1$  | 1   | $x > 1$      |
|----------------------------|---|------------------------|---------------|------------------------|-----|--------------|
| טון תוצא<br>מ. נ. א. נ. א. |   | $x = \frac{1}{e}$<br>+ | 0             | $x = \frac{2}{e}$<br>- | 0   | $x = e$<br>+ |
| מ. נ. א. נ. א.<br>טון תוצא |   | ↗                      | max           | ↘                      | min | ↗            |

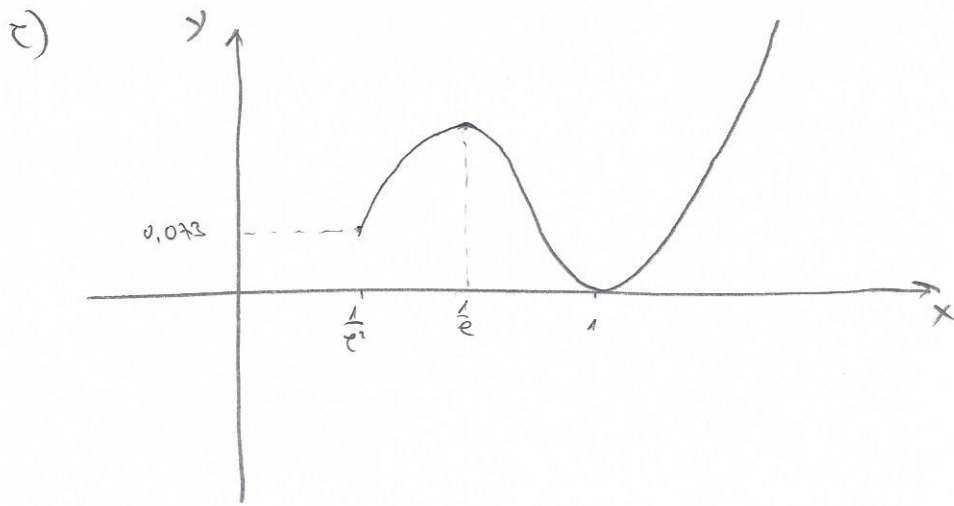
$\hat{F}\left(\frac{1}{e}\right) = \frac{2}{e^2} \cdot \ln\left(\frac{1}{e^2}\right) (\ln\left(\frac{1}{e^2}\right) + 1) = \frac{2}{e^2} \cdot (-2) \cdot (-2+1) = (+)$

$\hat{F}\left(\frac{2}{e}\right) = \frac{4}{e} \cdot \ln\left(\frac{2}{e}\right) \cdot [\ln\left(\frac{2}{e}\right) + 1] = 0.31$

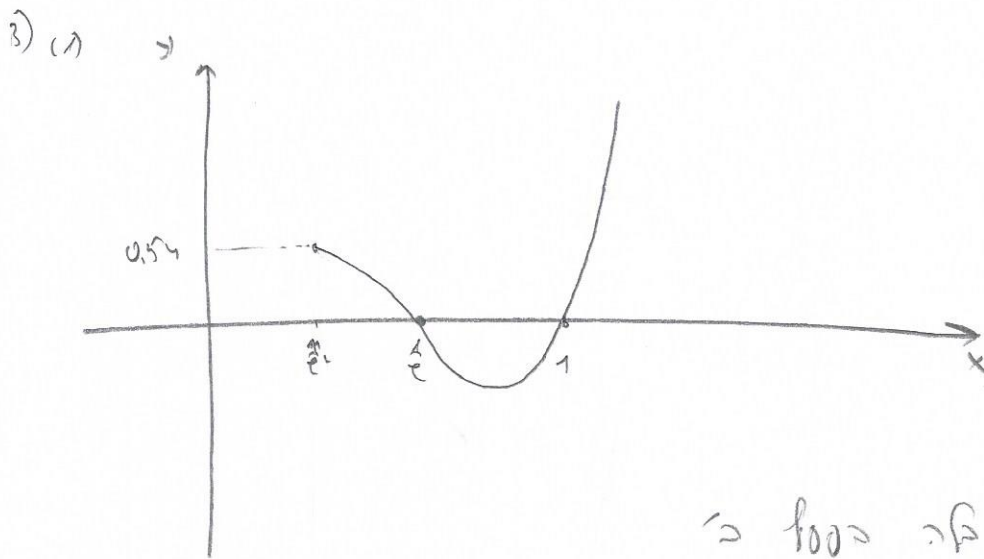
$\hat{F}(e) = 2e \cdot \ln e (\ln e + 1) = 4e > 0$

$\Rightarrow \max\left(\frac{1}{e}, \frac{1}{e^2}\right) \quad \min(1, 0)$

מ. נ. א. נ. א.



$$f\left(\frac{1}{e}\right) = \frac{1}{e^4} \cdot \left[\ln\left(\frac{1}{e^2}\right)\right]^2 = \frac{1}{e^4} = 0.073$$



↳ f(x) ist in x=1/e ein Minimum

$$f'\left(\frac{1}{e^2}\right) = \frac{1}{e^2} = 0.54$$

(2)

$$\int_{\frac{1}{e}}^1 [0 - f'(x)] dx = [-f(x)]_{\frac{1}{e}}^1 = -f(1) - [-f(\frac{1}{e})] = 0 + \frac{1}{e^2} = \frac{1}{e^2}$$