

הפרק נקרא "הפרק"   
 הכלל, הכלל, הכלל

$$\int \frac{\ln x}{x^2} dx = \int \underbrace{x^{-2}}_{g'} \underbrace{\ln x}_f dx = -\frac{1}{x} \cdot \ln x + \int \frac{1}{x^2} dx =$$

$$= \boxed{-\frac{1}{x} \ln x - \frac{1}{x} + C}$$

$g = -\frac{1}{x} \quad f' = \frac{1}{x}$

$$\int \frac{3x^2 - 2x - 3}{x^3 - 3x^2} dx = \int \frac{3x^2 - 2x - 3}{x^2(x-3)} dx = (*)$$

$$\frac{3x^2 - 2x - 3}{x^2(x-3)} = \frac{a}{x} + \frac{b}{x^2} + \frac{c}{x-3} = \frac{ax(x-3) + b(x-3) + cx^2}{x^2(x-3)}$$

$$b = 1 \Leftrightarrow -3 = -3b \quad : x=0$$

$$c = 2 \Leftrightarrow 18 = 9c \quad : x=3$$

$$-2 = -2a - 2 + 2 \Leftrightarrow -2 = a(-2) + b(2) + c \quad : x=1$$

$$a = 1$$

$$(*) = \int \frac{1}{x} + \frac{1}{x^2} + \frac{2}{x-3} dx = \boxed{\ln|x| - \frac{1}{x} + 2\ln|x-3| + C}$$

$$\int \underbrace{x}_f \cdot \underbrace{(3x+9)^9}_{g'} dx = \frac{x \cdot (3x+9)^{10}}{30} - \frac{1}{30} \int (3x+9)^9 dx$$

$$= \boxed{\frac{x(3x+9)^{10}}{30} - \frac{1}{30 \cdot 3 \cdot 11} (3x+9)^{11} + C}$$

$f' = 1 \quad g = \frac{(3x+9)^{10}}{3 \cdot 10}$

$$f(x,y) = x^4 + 2x^2 - 4xy + 4$$

: 2 נק' 0

$$(1) f'_x = 4x - 4y = 0 \Rightarrow y = x \xrightarrow{(2)} 4x^3 - 4x = 0$$

$$(2) f'_y = 4y^3 - 4x = 0$$

$$x(x^2 - 1) = 0$$

$$x = 0, x = \pm 1$$

$(1,1), (-1,-1), (0,0)$  : הנק' 3

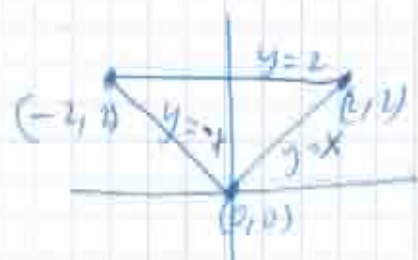
	$(0,0)$	$(-1,-1)$	$(1,1)$
$A = f''_{xx} = 4$	4	4	4
$B = f''_{xy} = -4$	-4	-4	-4
$C = f''_{yy} = 12y^2$	0	12	12
	$D = -16 < 0$ נק' 0	$D = 32 > 0$ $A = 4 > 0$ min	$D = 32 > 0$ $A = 4 > 0$ min

min -  $(-1,-1,3)$  , נק' 0 -  $(0,0,4)$  : נק' 0

min -  $(1,1,3)$

$$F(x,y) = xy^2 - xy$$

3) Sie



$$(0,0), (0,1)$$

$$(0,0), (-2,2), (2,2)$$

~~$$F_x = y^2 - y = 0 \Rightarrow y=0, y=1$$~~  

$$F_x = y^2 - y = 0 \Rightarrow y=0, y=1$$
  

$$F_y = 2xy - x = 0 \Rightarrow x=0, x=0$$

1) 1) 2) 1) 3) 1)

~~1) 1) 2) 1) 3) 1)~~

1) 1) 2) 1) 3) 1)

$$h_1(x) = f(x, 2) = 4x - 2x = 2x, h_1' = 2 \neq 0 \text{ (f'x)} : y=2 \text{ f'}$$

$$h_2(x) = f(x, -x) = x^3 + x^2, h_2' = 3x^2 + 2x = 0 : y=-x \text{ f'}$$

$$(0,0), \left(-\frac{2}{3}, \frac{2}{3}\right)$$

$$\begin{aligned} x(3x+2) &= 0 \\ \Leftrightarrow x &= 0, x = -\frac{2}{3} \end{aligned}$$

$$h_3(x) = f(x, x) = x^3 - x^2, h_3' = 3x^2 - 2x = 0 : y=x \text{ f'}$$

$$x(3x-2) = 0$$

$$x=0, x=\frac{2}{3}$$

$$(0,0), \left(\frac{2}{3}, \frac{2}{3}\right)$$

$$f(0,0) = 0$$

$$f\left(-\frac{2}{3}, \frac{2}{3}\right) = \frac{4}{27}$$

1) 1) 2)

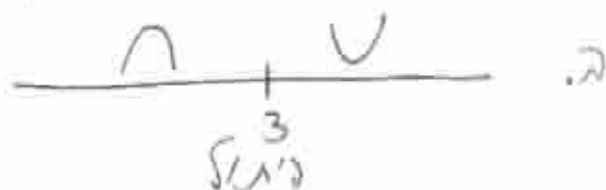
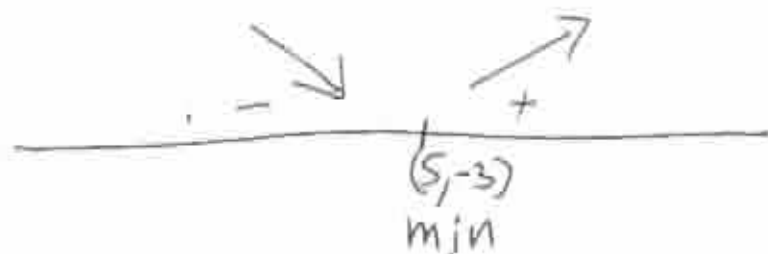
$$f(-2,2) = -4 \text{ min}$$

$$f(2,2) = 4 \text{ max}$$

$$f(0,1) = 0$$

$$f\left(\frac{2}{3}, \frac{2}{3}\right) = -\frac{4}{27}$$

שאלה 4  
כ.

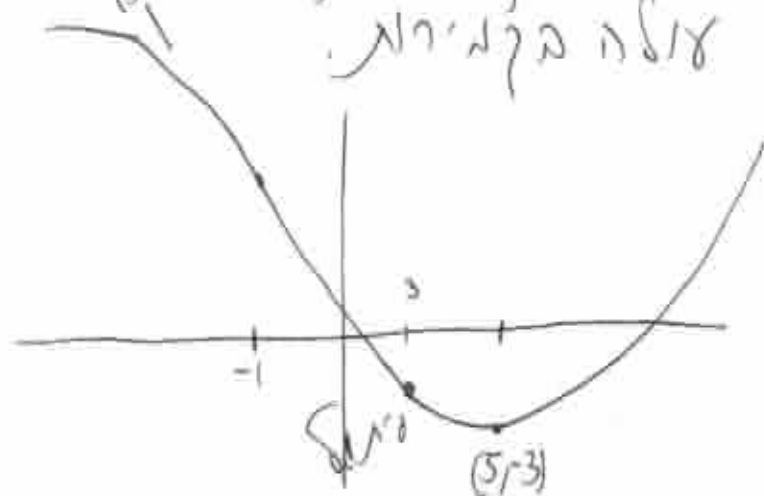


ג.  $\lim_{x \rightarrow \infty} f(x)$  לא ניתן לקבוע מאחר שהפונקציה

מתחילה בירידה קטורה.

מאחר שלקראת אינסוף הפונקציה  
עולה בקטירות.

$$\lim_{x \rightarrow \infty} f(x) = \infty$$



סוף  
 $y = f(x)$  של

ד. שתי נקודות ח' גוף

$$0 \leq x \leq 3$$

$f'''$	-	+	+
$f''$	-	-	+
	0	3	





~~1.  $y' = xy + y$~~

6. Skl

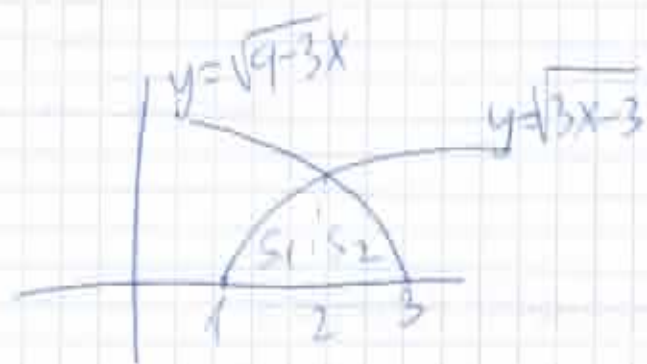
1

$$y' = xy + y$$

$$\frac{dy}{dx} = y(x+1)$$

$$\frac{dy}{y} = (x+1)dx$$

$$\ln|y| = \frac{x^2}{2} + x + C$$



- 7.56

$$9-3x=3x-3$$

$$12=6x$$

$$x=2$$

$$\int_1^2 \sqrt{3x-3} dx + \int_2^3 \sqrt{9-3x} dx$$

$$= \frac{2}{3 \cdot 3} (3x-3)^{\frac{3}{2}} \Big|_1^2 + \frac{2}{3 \cdot (-3)} (9-3x)^{\frac{3}{2}} \Big|_2^3$$

$$= \frac{2}{9} [\sqrt{27} - 0] - \frac{2}{9} [0 - \sqrt{27}]$$

$$= \frac{2}{9} \sqrt{27} + \frac{2}{9} \sqrt{27} = \frac{4}{9} \cdot \sqrt{27} = \frac{4}{9} \cdot 3\sqrt{3} = \frac{4}{3} \sqrt{3}$$

2.31