	Tutorial 7
· · · · · · · · · · · · · · · · · · ·	The second derivative test:
	$f(x,y): \mathbb{R}^2 \supset X \rightarrow \mathbb{R}$
	$(20, y_0) in a critical point$ $D = f_{xx}(20, y_0) f_{yy}(x_0, y_0) - f_{xy}(x_0, y_0)$
	a) $D > 0$ , $\int \alpha x \left( \frac{\gamma_0}{y_0} \right) \Rightarrow 0 \Rightarrow \text{ relative min}$
	b) $D > 0$ , $\int_{XX} (x_0, y_0) < 0 = 7$ relative max c) $D(x_0, y_0) < 0 = 7$ saclable point
	d) $D=0 = 7$ no conclusion.
en e	locate all relative max, min, saddle points.
and a second second	$\int \int f(x,y) = x^2 + xy + y^2 - 3x$ $\int \int \int f(x,y) = 2x + 2y = 0$
	$\int_{\mathcal{Y}} (x, y) = x + 2y = 0$ $x = -2y$
	$\frac{-4y+y-3=-3y-3=0}{y=-1, \alpha=2}$
	(2,-1) - critical point
and the control of th	$f_{\alpha\alpha} = 2$ $f_{\alpha\gamma} = 1 = 2  D = 2 \cdot 2 - 1^2 = 3 = 0$
	$\int_{2\pi} \frac{1}{2\pi} dx = 2 > 0$ $\int_{2\pi} \frac{1}{2\pi} = 2 > 0$ $\int_{2\pi} \frac{1}{2\pi} dx = 2 > 0$ $\int_{2\pi} \frac{1}{2\pi} dx = 2 > 0$ $\int_{2\pi} \frac{1}{2\pi} dx = 2 > 0$
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pro-mandare de se un méthodo la ce des la décimie ay manuel	2 f(x,y) = xey
	$f_{\alpha} = e^{\frac{\pi}{4}} \neq 0 = \infty \text{ no critical points}$ $f_{y} = \alpha f_{z} e^{\frac{\pi}{4}}$
	$f_{\alpha} = e^{\alpha} \neq 0 = 7$ no oritical points
	$\int \int \int \frac{dy}{dx} dx$
and the same of th	
	3 $\int (2,y) = x^2 + y - e^y$
and the second security of the second se	P A
البينية جمعاني والاناة ورائه الحاج جد سد البيمان «مسميدة بمؤسنات مند بيت	$ \int_{\alpha} = 2\alpha = 0 \qquad q = 0 $ $ \int_{\alpha} = i - e^{i\beta} = 0 \qquad q = 0 $
بعود وطول الآل و كالمنوا المدعو المستوينيون وينا بالإنجاز المالية المستوين	13
	(0,0) - critical point
e Norwegidenii a kinnennääinnud oo naäineine nões on säin on aa k	
ب در	$f_{\alpha\alpha} = 2$ $f_{\alpha\beta} = 0$ $D(0,0) = 2 \times (-1) - 0^2 = -2 < 0$
a remainment a successive and the first language of Mysterion and the first language of Mysterion and the first language of the firs	$\int_{yy} = 0$ $\int_{yy} = -e^{y} = -1 \text{ for at } (0,0)$ $\int_{(0,0)} \frac{1}{(0,0)} = 2 \times (-1) - 0^{2} = -2 < 0$ $\int_{(0,0)} \frac{1}{(0,0)} = 2 \times (-1) - 0^{2} = -2 < 0$ $\int_{(0,0)} \frac{1}{(0,0)} = 2 \times (-1) - 0^{2} = -2 < 0$
	Antique of a section of a secti
for their radicions, among the first or the experience for animals.	(4). Find the absolute man and min over the R-
r (ME 1416) territologica argando no est acaminas de ser tacor	rectangle region with verticals $(0,0),(0,1),(2,0)$ $f(x,y)=xe^{y}-x^{2}-e^{y}$
	1///2
lasteraide sui la principa de la suita	$\int_{\mathcal{A}} e^{3} - 2\alpha = 0$
	$\int_{y} = x e^{y} - e^{y} = 0$ $e^{y}(x-1) = 0 = 7 = 1, e^{y} = 2 = 7y = \ln 2$
to a the second	(1, ln 2) is not in the rectangle.
·····································	The rides of the rectaugle:
nanga kangka sa di manganga sang Bir Springering, San and Madalana.	$0 = 0 \qquad 0 = y \le 1$
	$f(0,y) = -e^{y} - monotone, no exitical points$
	$\frac{f(0,0)=-1}{2},  \frac{f(0,1)=-e}{2}$
	2) $f(2,y) = 2e^{\frac{y}{2} - 4} - e^{\frac{y}{2}} - e^{\frac{y}{2}} - 4$ - monotone
through the section of the section o	$\int (a,0)=-3$ , $\int (a,1)=e-4$
	3). $y=0$ $0 \le x \le 2$
	$l(\alpha,0) = \alpha - \gamma^2 - 1$
	$f'(x,0) = -2x + 1 = 0  \text{for}  x = \frac{1}{2}$ $f(\frac{1}{2},0) = \frac{1}{2} - \frac{1}{4} - 1 = -\frac{3}{4}$
NEXP*ALIZATION AND THE	$\int \left(\frac{1}{2}, 0\right) = \frac{1}{2} - \frac{1}{4} - 1 = -\frac{3}{4}$
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	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
· · · · · · · · · · · · · · · · · · ·	$d(x,1) = ex - x^2 - e = -x^2 + ex - e$
para yan	$\frac{\int (2,1) = -2x + e = 0}{\int (\frac{e}{2},1) = -\frac{e^2}{4} + \frac{e^2}{2} e = -\frac{e^2}{4} - e = 0.88}$
en met type i statut et een maandele stat gevel te	
	absolute min at $(\frac{1}{2}, 0)$ : $\int (\frac{1}{2}, 0) = -\frac{3}{4}$
	(5) $f(x,y) = xy^2$ $x > 0, y > 0, x^2 + y^2 \le 1$
ant error o a se estado e e emissión del transferención e e el forte y e e en el como e e e e en el como en el	$\int_{-274}^{2} = 0 \qquad y = 0$
e e e	$\int (x,0)=0  \text{for}  + \cdot  \propto \in [0,1]$
	2) $x=0$ $0=y=1=7$ $(0,y)=0.y^2=0$ 3) $x^2+y^2=1=7$ $y^2=1-x^2$
	$f(\alpha, y) = \alpha y^2 = \alpha (1 - \alpha^2) = \alpha - \alpha^3$ $f' = 1 - 3\alpha^2 = \alpha = \pm \frac{1}{13}, \text{ but } \alpha \in [0, 1] = \alpha = \frac{1}{13}$
**************************************	$y = \sqrt{1 - \alpha^2} = \frac{\sqrt{2}}{\sqrt{3}}$
**************************************	$f\left(\frac{7}{13}, \frac{7}{13}\right) = \frac{1}{13}, \frac{2}{3} = \frac{2}{3\sqrt{3}} - \text{absolute max}$
	$\frac{7}{7}(x,y) \in \mathbb{R}^2$ ; $(\alpha = 0, y \in [0,1]) \cup 2y = 0, x \in [0,1]) - abs. min.$
and the same of th	Method of Lagrange multipliers
	$f(x,y) \in C'(R)$ $g(x,y) = 0, \forall g \neq 0$
	If $f(x_0, y_0)$ has a constrained relative extr. it $f(x_0, y_0)$ then $\nabla f(x_0, y_0) = 2 \nabla g(x_0, y_0)$
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Use hagrange	multipliers to find the max and min
	$\frac{y^{2}}{y^{2}},  x^{2}+y^{2}=25$ $x^{2}+y^{2}-25=0$
	$2\pi, -2y$ ), $pg = \langle 2x, 2y \rangle$
$ \begin{aligned}                                    $	$\frac{1}{3} \frac{1}{3} \frac{1}{3} \frac{1}{3} = 0$
if a	$y = 1 = 3$ $y = 0$ $y = \pm 5$ $y = -1 = 3$ $y = \pm 5$
\$\left(l0, \pm 5\) \$\left(\pm 5, 0\)	= 0-25 = -25 - min  at (0,5), (0,-5) $= 25 - mox  wt (5,0), (-5,0)$
closest to (1) $d^{2}(P, P_{0})$ $g(\sigma, y_{0})$	on the plane $4x+3y+2=2$ that is $-1,1)=P_0.$ $\int = (x-1)^2 + (y+1)^2 + (x-1)^2 = f(x,y,z)$ $f(x)=4x+3y+2-2=0$
∀f= <	2(x-1), 2(y+1), 2(z-1) > 24, 3, 1>
$ \frac{2(x-1) = 4\lambda}{2(y+1) = 3\lambda} $ $ \frac{2(z-1) = \lambda}{4x + 3y + z - 2} $	$2x = 2\lambda + 1$ $y = \frac{3}{2}\lambda - 1$ $2 = \frac{\lambda}{2} + 1$ $0 \qquad \beta \lambda + 4 + \frac{9}{2}\lambda - 3 + \frac{\lambda}{2} + 1 - 2 = 0 = > 13\lambda - 1 = 0$
	$\frac{2}{13} + 1 = \frac{15}{13},  y = \frac{3}{26} - 1 = \frac{23}{26},  z = \frac{1}{26} + 1 = \frac{27}{26}$ $\frac{3}{6},  \frac{27}{26}$ is the closest point to $P_0$

	Find a vector in 3-space whose length is 5
	and whose components have the largest possible sum.
	$V = (2, 4, 2)$ $ V = 5  = 2^{2} + 4^{2} + 2^{2} = 25$ $\int (2, 4, 2) = x + 4 + 2$ $\int (2, 4, 2) = x^{2} + 4^{2} + 2^{2} - 25$
	$\nabla f = \langle 1, 1, 17 \rangle$ $\nabla g = \langle 2x, 2y, 2z \rangle$
	$ \frac{1 = 2\lambda \alpha}{1 = 2\lambda y} $ $ \frac{1 = 2\lambda y}{1 = 2\lambda} $ $ \frac{1 = 2\lambda^{2}}{1 = 2\lambda^{2}} $ $ \frac{1 = 2\lambda^{2}}{1 = 2\lambda^{2}} $ $ \frac{1}{4\lambda^{2}} + \frac{1}{4\lambda^{2}} + \frac{1}{4\lambda^{2}} = \frac{3}{4\lambda^{2}} = 25 $
	λ - ± √3
Access to the second	$\lambda = \frac{13}{10} = 2 = 2 = \frac{5}{13}$
	$\lambda = -\frac{\sqrt{3}}{10} = 2$ $2x = y = 2 = -\frac{5}{\sqrt{3}}$
	$\left\{\left(\frac{5}{3}, \frac{5}{3}\right) : \frac{15}{3} - \max_{x}, \frac{15}{3}\right\}$
	11-3-3,-3)=-3
	Hint for the last problem in ass.7.:  1) $(a^{2})! = (e^{\alpha \ln a})! = \ln a \times e^{\alpha \ln a} = a^{\alpha} \ln a$ 2) Use $\frac{d}{d\alpha} \int_{0}^{\infty} t^{2\alpha} dt = \int_{0}^{\infty} \frac{2}{\alpha} t^{2\alpha} dt$