Vectors in Rand R?  $\frac{1}{3}$   $\frac{(a,b)}{x}$  $\vec{V} = (a_1 b_1)$   $\vec{j} = (1, 0)$   $\vec{j} = (0, 1)$   $\vec{j} = (0, 1)$ The length of P, donoted 11711, 3 11 V 11 = (a2+62) 1/2 is a unit vector it livil =1 In 30:  $\nabla = (a, b, c)$   $\vec{v} = (l, 0, 0)$   $\vec{v} = a_1 + b_2 + c_3 = (0, 1, 0)$   $\vec{v} = (0, 0, 1)$  $\mathcal{Z} = (0, 0, 1)$ length of in 30 IIVII = (a2+b2+c2) Pot Product.  $\vec{a} = (a_1, a_2, a_3)$   $\vec{b} = (b_1, b_2, b_3)$  $\vec{a} \cdot \vec{b} = a_1 \vec{b}_1 + a_2 \vec{b}_2 + a_3 \vec{b}_3$ = 11 211 11 BII cos 0

The directional derivative of fix, y)
at (Xo) Yo? is the direction of the
unit vector Bis
$D_{\overrightarrow{U}}f(x_0, y_0) = \lim_{h \to 0} f((x_0, y_0) + h\overrightarrow{U}) - f(x_0, y_0)$
lef $\vec{S} = (a,b)$ and $g(t) = f((x_0, Y_0) + t\vec{\sigma})$ = $f(x_0 + ta_0 Y_0 + tb)$
$\cdot$
g((0)= lim g(h)-g(0) = lim (f((x0) y0)+h0)-
$g'(0) = \lim_{h \to 0} g(h) - g(0) = \lim_{h \to 0} \left[ f((x_0, Y_0) + h\vec{0}) - h + o f(x_0, Y_0) \right] / h$ $= D\vec{v} f(x_0, Y_0)$
- Dプナ(xo) Yo)
g'(0)= fx(x0, Y0) fx(x0+ta) to the topto
1
+ fy (x0, Y0) \$ (Y0+tb) (x=0
= fx (x0, x0) a + fy (x0) x0
•

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Example	fixxy	$)=x^2+x^2$	7-7-	at (1,1)
		,		
tind direc	ctional deri	va tive of	f(X)y	) at(1,1)
in the d	Irrection C	3,4),		
$f_{X}=J_{X}$	Px(1,1)=	=2 +	Py = 7+2;	+ fy(1,1)=9
Dufl131)=	= 2 1 <u>U</u> . i	+ 91	<u>U</u> 13	
	21 3	y + 9 !	2 2 1/2) 1/2	
	2 1 3 (3 <sup>2</sup> 74 <sup>2</sup> )1' 6 5	+ 36 Bita	3 = 36	42
EX 3	at (1,1)	in the	direction	n Jowards
(4,5).				from (1,1)
Commence of the control of the contr	and a second land to the second relation of the second second second second second second second second second			

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