

we need to find dy

 $\frac{df}{dz} = \frac{d\left(e^{-\frac{1}{2}z}\right)}{dn}$   $= \frac{1}{2}e^{\left(-\frac{1}{2}z\right)}$ 

 $\frac{dz}{dy} = \frac{d}{dy} \left( y^{T} S^{-1} y \right)$ 

= 25 y

dy = d (n-u)= I, which is identity matrin.

J. Usang the Chain sule:
de 2 de de de dy

dn d2 dy dn

ind = 1 e<sup>2</sup> · 25 y · I

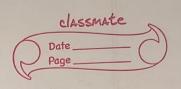
(b) | (n) = tor (nn + 62 I), n EIP. (Hent: non 95 the outer perioduct, so you perform the outer perioduct operation quietly emplicitly florest to make 84 easses.)

ue need to find de

(C) Use the chain rule Perovide the dimensions of every single partial derivative. You do not need to compute the periodict of the partial derivatives

Clary chain eule:

$$dz = A$$



de de de

de = cos (z).A.

The dimension of (dy) is (MXN), which notices the dimensions (dn) of (A).

- (3) Consider the following functions:  $f(n) = sen (n) cos (n), n \in \mathbb{R}^{2} 112$   $f_{2}(n,y) = n^{2}y, n, y \in \mathbb{R}^{2}$   $f_{3}(n) = nn^{2}, n \in \mathbb{R}^{2}$
- (a) What are the dimensions of df 9
- (b) Compute the Jacobsans

(a) - For the function f (n) = Sin (n) cos (n) the deurnate of well have the same demensions as 26,

- The function of (n,y) = n y, the derivate of well don

have dimensions AXA because it takes in and yas inputs and has an inner purdent operation.

The function f3 (n)=nn the devanative of will have



dimension nxn because et involves an outer pereduct of n with etself.

9) f (n)= Sin(n) cos (n)
Using chain eule:

de = d [ch (n) ws (n)]

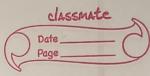
 $\frac{2}{df} = \frac{\cos(n) \cos(n) - \sin(n)}{\cos^2(n) - \sin^2(n)}$ 

 $\frac{df_2}{dn} = \frac{d}{dn} \left( \frac{x^T y}{x} \right)$ 

de = y

dh = nn (nnT)

dr In



(1)	Find the maclaurin series for f Use the result from (a) to find the Maclaurin Series for g (n) = nen!
(1)	Use the everut from (a) to 1500 the Madanus Courses
$\rightarrow$	for g (n) = nen!
(a)	$(n) = \rho^n$
	Ultry taylor series enpansion for excentered at n=0.
	$e^{n} = e^{n} - e^{n}$
(b)	multeplying each team in tog (P) byn-
	g(n)=noen=
	$= n \cdot \mathcal{E}_{n=0}^{\infty} \mathcal{H}^{n}$
	N.
	C) O n+1
	$g(n) \geq \varepsilon_{n-0} \frac{n+1}{n!}$
	Y