| •)             | cancellation raw '  |
|----------------|---|
|                | 9 + min, e t N then   |
|                | M+N = M+l => n-0.   |
|                | tion tion reduced Learner works per of lead of a suchha of    |
| Condend        | Proof: 1000 1   |
| 153            | a)P(m): m+n = m+l   |
|                | 8) P(0): 0+n = 0+2 => n=2                                     |
| 4000           |   |
|                | c) Assume P(M) is true; the                                   |
|                | man = mal => n = l  |
|                | > show that P(my) is also min                                 |
|                | [Nonex] N - N + O DINA  |
| Olive Since of | ** ** * * * * * * * * * * * * * * * *                         |
|                | Lotte in - 1944 City we define addition the many we           |
|                | (dance store top thin   |
|                |   |
| (•)            | order trelation withhos device a source and average and a man |
|                | · Let m, n & N then m is greater than equal to n              |
|                | (m), n or n < m) if I another natural number &                |
|                | such that god and it is a condition of a                      |
|                | M= n+l HOAA DWULA (S)   |
|                | APR = (OANA) =  |
|                | · ms trictly greater than n                                   |
|                | m) n if m + n   |
| EN 3 K         | see not and as (m) a moderne market produced to the for all   |
|                |   |
|                | Trichotomy of No.   |
|                | for any 2 minter, one of the relations is true                |
|                | (man, mem)  |
|                |   |
|                |   |
|                |   |

e) Principle of well ordering :

Every non-empty subset of N has a least element

proof : [Proof by contradiction]

- Assume Fix a non-empty set & of N with no reast doment

a) Define property: P(n): n &s Ynth

b) P(0) :

suppose Ots then it will least element. Then Of's by assumption contradict assumption 2.

DP(0) is mue.

es et p(n) is true éo eo n \$ s

we need to show that P(n++) is true as well i.e. n+1 & s

If n+1 ts then (n+1) will be a least element

>> P(n++) is true as well !

2 Inital assumption is wrong.

## 1) Multiplication

Def:

a) 0xm=0

(n++)Xm = inter + m

## Claims:

0 mx0 = 0

D m x (n-1) = mxn + mxe

3 mxn = nxm

\*) Emponentiation:

a) p' mo = 1 [convention 00 = 1]

b) If me" is defined then mm = m x m 1 302 % E ANT : DANG IT (PAR) 9

) Zenmalo - Frankel set Theory:

collection of elements objects.

" Il andanis

· Aniom 1 . The set are also objects.

Arriom &: There entits an empty set that has no objects

Aniom 3: Let a be an element object then say it called exists and is called a singleton set

=> 50 y is a singleton set sensital to make & model Be use 19, called the set of nations. The profession

Amom 4. 9 + A & B are sets then AVB is also a set which is defined

MAUB = S. M. : NEA or NEBY DESCRIPTION & SOURCE OF STATE OF STATE

· A= B 9f ntA => ntB B of neB => ntA B new ALB POLA PLA

Aniom 5 | Aniom of specification 1

Let A be a set and NEA. Let P(n) be a property of a Then Franset 8 H & AJH 2 or unlines me do 8 22 mounts

B= SxEA | P(n) is true y (DEA technically)

such that

y &B >> P(y) is true

Ariom & Ariom of replacement: Let A be a set. Let 71 A let y be an object Let P(M, y) be a prop. such that for each no there is at most one y such that P(m,y) is true. Then I a set!

B= & y | P(M, y) is true for some AEAY Horisto La Chambala 18 10 Hann such that, ZEB >> P(M, E) Is true for some MEA.

# B: Range

# This is essentially talking about functions.

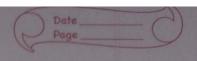
e Arum 7 | Arum of Infinity: I a set 19, called the set of natural numbers with objects DENS AME'NO for each nEN eatisfying all Peano anioms ANION 4: 3+ A & BO ONG SOR THEN AUD IN OLD & SEE LOWER

Andrew 3: Lot a be an element object toom Say is content

· Amom8 / universal specification . XX [FAKE. Look at Russel's Paradon Let n be an object and P(n) be a property of n. Then 3 a set ask to & same A so go co so a B= { x | P(m) is me y

yEB >> Ply) is frue

and see A let Plan be a # Armon 568 are somilar. In 5, net & in 8 x this any object (not a part of a set) .



· Russel's Paradon:

Property: PIND: "m is a set and n & n"

Liet & object

Define: U= {n/pm) is mue? LEnux from aniom &]
8) V & U?

set U is web > A) Osay VEU >> P(U) is mue >> U is a set and V&U.

P(N) is used >> Osay V&U >> P(U) is true >> V&U

permation
p

· Aniom 9 | Regularity:

9f A is a non-empty set then there enists at least one elements conicults either not a set or not equal to A.