proof Techniques (P-94)

Hypothesis and conclutioning in six soins my clam: If it rains; I will stay home is How to prove it? wars and tenm little We cannot prove the statement untill it's paix the raining hypothesis is true. 1 priove that out integer in is even, then 3n+2 is also even. hypothesis: - n is even conclution: - 3n+2 is even Letin be event siever, 12 = stre 191 Let n=2k, where kis en integer -1.3n+27-4-4-00 - WE 3-= 3(25)+2 22(3K+1) .. 3n+2 is even it is al ship fol 1969minus et si svado 1+212 or tel

since k is an integer of sold and integer of the sold and integer of the sold and integer of the sold and integer, and and integer, and and is even in sold even and integer, and the sold even and the sold even

(p=9) 200pirist - - 1,0000

Let, 3n+2=2k, where kins on integer integer in 3n+2=2k

 $\Rightarrow 3n = 2 + 2k - 2$

Let 3n+2 be even, but nie odd Let n= 2k+1, where k is an integer

3442

3(1)47

(17. NE) .

proof by contrapcitive (-4-1)

= 2(3k+2)+1

Since k is on integer, (3k+2) must be intege

-1 2 (3 k+2)+1 must be odd 1+10-19 +31

.. 3n+2 is odd (3+(1+19) = 9-108.

this contradicts with our assumption than 31+2

n connot beodd odd

-in is even the stranger it (stras) si

(become) . Wo di (precond)

Hapothesis, 3n+2 is even condution: nis even It is sufficient to proof that if nis odd, the 3n+2 is odd

Let n be odd " (state) in con ei d somis

Let n=2k+1, where kis an integer.

-: 3n+2 = 3 (2k+1)+2 bio ci s+ms ...

ende monte another sen was the stortoning site.

= 2 (3k+2)+1

since h is an integer;

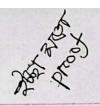
3k+2 must be on integer forms

-i 2 (3k+2)+1 must be odd 15010

- 3M+2 is odd. (preored)

Indirect proof 曲 prove by 1 contraposition prove by contradiction (conditions wrom) (condition जा भारतक दान) 田 controdiction pora prove by contradiction that we is an impational number was a print him raver exemple Let vz be a trational mumber 21 6: Let $\sqrt{2} = \frac{1}{9}$, when p, q are integer, $0 \neq 0$ and p, q has no common tactors other then 1 mmm on and $-i \frac{p}{q^2} = 2$ 10000100 per 1000001 - Vi is irroduced = pt = 292 (1.000,1) Since 22 is an integer, 24 must be even -ip is even and

Let p'22k, where k is an integer 1010 (2K) = 28 po svory prove by control chon 2) 4k = 209 (50 00 00) (50 00 00 00 00 00) => 9= 22 preg rowitos @ since k'is on tingeger, 2kt must be even - 9 is even, and thus q is even = 2 is a common faction of pond q to: This contradict with our assumption, that P, a has no common factors other than 1 -. V2 cannot be rational - 12 is irrational. prove1) can integer 20 most be even GEVS ST Y'mare of 4 tono



prove that the product of two rational number is rational.

Hypothese: - h, and rz dre two rational numbers. conclusion: _ repris quitomal, 17+ 10 212 3 1/2011

Let Ri = 9, R, = 120 21 here 1, a. 12 % are freger

-: RiR2 = Pi x Pi 22 Pil2 Pil2 2 Pil2

Since P.P. are integer P.P.2 is also integers

since 9,92 are non zero integers, 9,42 is also of non zero

integer

2192 is portional

-: R.R2 is rotional (proved) of today (10-14-11)

: m+p= 21:1-7+210=31

= 2 (K, + 12 - 12)

is a (Marks -u) must by seeing

[note: irrational proof or indirect proof 2007]

prove that, if m, n, p are magers, and m+n and htp are even then m+p is also even. Hypothesis, men and inter are even medianos Extraorication; mtp is even Let m+n = 2k, 1 to even n+p= 2k2 where k, k2 are integer some m = 12k - n. रामाहत के मेर कर गामा उनाट विकास · m+ p= 2k1-7+2k2-7 10 /00/-11 = 2 (k, + k2-n). since k., k2 191 are integers (k.+k2-n) must be an integers! ? = 2 (kitki-n) must be even tools developed to for · m+p even (priored)

prove that, If his irrational, then I is also irrational

Hypothesis: - n is irrational to lawre by other

conclution: - is irrotional

it is sufficient that,

It is prational, then, n is also rational.

Let $\frac{1}{n} = \frac{p}{q}$, where p, or over integer and of to

and p, a has no common factor other

than a 1 pt 1 + 91

Here p comot be zero into that ease,

1 = 0 = 0 = 0

 $\frac{1}{N} = \frac{1}{\rho} = \frac{a}{\rho}$

Since 9, P are integer and P+0 1 01 20113

n'is kotional.

prove that, the sum of an irrational and a reational number is irrational.

Hypothesis .. n is on irrational number any y is a pational number.

conclution: (n+y) is inational

Let $y = \frac{p}{q}$ where, are integers and \$9.70

Let hty be national and nty = for whe piq' over Integer q' to

of my and on the state of the

$$n + \frac{p}{q} = \frac{p'}{q'}$$

$$\Rightarrow n = \frac{p'}{q} - \frac{p}{4}$$

$$= \frac{p' - p}{qq'}$$

since p, a, p, a' are integers p'a-Pa' is an integers since a, a' are non zero integer qq' is or non zero integer.

$$\frac{1}{49!} = n \text{ is rational.}$$

this contradict to the hypothesis that wis irrational

$$f(0)$$
, where $P(N) = (n > 1) \rightarrow (n > n)$

$$F \rightarrow ?F \Rightarrow T$$