- 1) mand n are both integers with n=0 5m1/2n
 - 5 is integer and m is integer, therefore there product will be an integer
 - · Since 12 is integer and n is inkgon, there product will be an Integer
 - Since 5 m is an integer and 12n is an integer, their Product will be an integer
 - · Since 4 is an integer and nisd integer, 4n 13 an Into
 - 5m +12n int = ratio of ints
 - 5mt12n
 - n does not equal of morms the domin Cannot equal O
- 5m+12n is a voltona I number, the new and deman · mregers are both non-0
- 2) 0,6, c,dint, axc x is red num

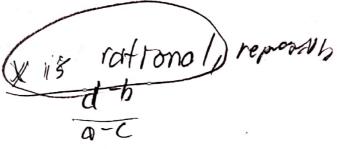
$$\frac{\partial x + b}{\partial x + b} = 1$$

$$\frac{\partial x + b}{\partial x + b} = \frac{\partial x + d}{\partial x}$$

$$\frac{\partial x + b}{\partial x} = \frac{\partial x + d}{\partial x}$$

$$x(a-c) = d-b$$

$$x = \frac{d-b}{a-c} = non-0, m+1$$



5) d) treal numbers, m, 16 m is on theyer, then m is a rational number. m= m & nonzero mts m=m 13 a rational number, Every integer is a rational number 3 b) 0 x2+bx+c=(x-r)(x-5) Prove if soln. is rator then form is rational • $x^{2}+bx+c = x^{2}-rx-sx+rs$ • $x^{2}+bx+c = x^{2}+xcr-s+xs$ Coefficients must be equal · b= (-r -5) , bts = -r-h · S=-r-b -risrational b is ryamal o the difference of two rational numbers is rational . If one solution for the graduative equation "X2+ bx+ (=0" is rottonal, the
other solution is +150 vational 4) Proove (2m+10) is demost by 4 · 6m(2(m+5)) isdevisible 12 m (m+5) · 4.3.m(m+5) " = 3m(m+5)

5) Prove: Vinto amb by if all then a2/62
a assume a and b are into and alb
· x such that $b = ax$
$b^2 = (0 x)^2$
$a b^2 = a x^2$
estrice de square of an intis on int, x2 is int
There exists on int k, (k=x2), south
There exists on int k, $(k=x^2)$, so then $b^2 = d^2k$ and b^2 is then dering by d^2 , noted as
d 2/bc
6) Prove: nisnon my mus musc decomol ends the Then
on=dx.10"+dx-10", -d2.102+d1.10+d0
n = only non mey integer ending on 5
$a 10^{k} = (2.5)^{n}$
• $(2.5)^k = 2^k \cdot 5^k$ • $(2^k \cdot 5^{k-1}) + d^k - 1(2^{k-1} \cdot 5^{k-2}) + \dots + dx \cdot (2^2 \cdot 5)$
· 5 (dh. (2.05)
+ d1.2+1)
5(") Strice we can factor or a 5, we have n= 5(int)
<u> </u>

```
n=2k
7) def of even =
   · n(n+1) = 2K(2K+1
            = 24.2K+2K.
            = 4k2+7K
            = 2(2k2+K
        n= 2k+1 if Megrar is odd
   · n4= (2K1)
   0 ny= (24+1)2 (2k+1)2
    ny=(4k2+4k+1)(4,224/6+1)
  o nt = 16k4+32k3+24k2+8kH is an integer
 8 (2k4+4k73k2+k) + 1
Therbox 8 m + 1 it m is ideger
             if even
          n=2k
         n4=(2H)4
         n4=24 K4
                        M= ZK4
         n4-16x4
                     In is of form 8m cor
         n4=6(ZK4)
                       8m+1 of any case
          n4=8m
```

```
Toprove: Hint m,d, h, if d>0, then (m+dk) modd
= m mod d
 m, d,k int such that d>0
  r= m mod d
 m= dq+r
  m +dk = (dq+r) +dak
         = dq + r + dk
         < d(9+k)+1
            9+k is an integer since 9 and k are
             integers
  there exists m= 9+h (m+dh) = dm +r by
   the grotes ramorder theorem
         (m+dk) mod d = m = 9+k
(m+dk) dland = Y
Since, r = m \mod d, (m+dk) \operatorname{divd} = r = m \mod d
```

1,01

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