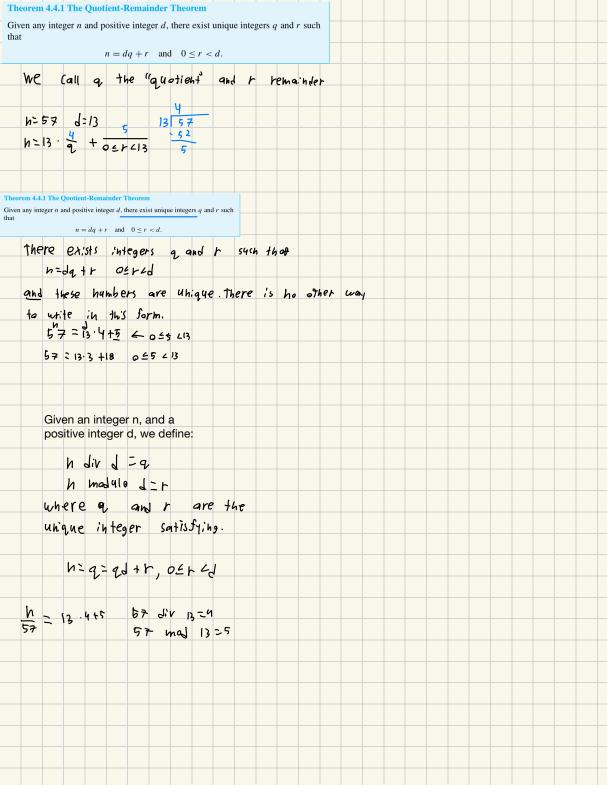


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Example 4.4.4 Solving a Problem about mod Suppose m is an integer. If $m \mod 11 = 6$, what is $4m \mod 11$? Since m mad 11=6 then

m=11-q+6

Where q ϵ \neq 4m = 4(119,+6) = 44 a +24 211(49)+22+2 4m = 11 (4q+2)+2 4m mod 11= 2 Theorem 4.4.3 The square of any odd integer has the form 8m + 1 for some integer m. H;n ↑ Prove this by using the quotient remainder theorem with d = 4 Proof: Suppose n is an odd integer. By the quotient remainder theorem, with d = 4, either h=4k or h=4k+1 or h=4k+2 or h=4k+3 for some kez Since h is odd, hz 4k and hz 4k+2 = 2(ck+1) Sa either h=4k+2 or 4k+3 (ase 1: If h=4k+1 then h2=(4k+1) = 16k2 + DK +1 28(2k2+k) where 2k2+k67 Case 2: If hat k+3 then b2 = (4K+3)2= 16 k2 +24k+9 = 16 x 2 + 24 K + 8 + 1 = 8 (2 x 2 + 3 x +1) +1 where 2 k2 + 3 k+1 & 2