CSE 20: Week 2 Quiz Solution

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1 Find the 8-bit two’s complement of $72_{10}$.
   Soln: $72_{10} = 01001000_2$. To find the two’s complement
   1: we flip (all 8-bits): 10110111
   2: Add 1 : 10111000
   The answer is $-72_{10} = 10111000_2$

2 Prove, by contradiction, that if $n$ is an integer and $n^2$ is odd, then $n$ is odd.
   Soln: Definition of even integers: An integer $n$ is even if there exists an
   integer $k$ such that $2k = n$.
   A = ”$n$ is an integer and $n^2$ is odd.”
   B= ”$n$ is odd.”
   Assume A and NOT B = ”$n$ is even.”
   If $n$ is even, then there exists an integer $k$ such that $2k = n$. Then
   $n^2 = (2k)^2 = 4k^2 = 2(2k^2)$. Then $n^2$ is even since there exist an integer
   $(2k^2)$ such that $2(2k^2) = n^2$ (by the definition of even integers). Note that
   $2k^2$ is a integer since the product of three integers is an integer.
   We then have $n^2$ is both even and odd which is a contradiction. Therefore
   B = ”$n$ is odd.”