

**Math 2150 Assignment 7 DUE BY SATURDAY, JULY 18 AT 11:59 PM AS A PDF  
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(1) Prove that the sum of an odd integer and 3 is even (there is only one variable being (implicitly) quantified here). Do a “preformalization” here as I did in the notes, and use a direct proof.

(2) Prove that the difference (you should know that this means subtraction) of an odd integer and an even integer is odd. Do a preformalization first, and use a direct proof.

(3) Prove that the square of any even integer is even. Preformalize and give a direct proof.

(4) Prove by contraposition that for every integer  $n$ , if  $n^2$  is odd, then  $n$  is odd. Preformalize first. [Observe that I did a similar problem in the notes.]

(5) Prove by contraposition that for all real numbers  $a$ ,  $b$ , and  $c$ : if  $a \geq b$ , then  $a + c \geq b + c$ . Preformalize first. [Again, observe that I did a similar example in the notes.]

(6) Prove by contraposition that for all real numbers  $x$  and  $y$ : if  $xy \leq 0$ , then either  $x \leq 0$  or  $y \leq 0$ . Preformalize first.