

You must follow all of the requirements for writing and turning in homework which are given in the syllabus, or you will lose some or all credit on your homework.

Do **not** turn in this homework sheet with your answers.

The Campus Senate has adopted a policy asking students to include the Honor Pledge on each assignment in every course: “I pledge on my honor that I have not given or received any unauthorized assistance on this assignment.” Consequently we request your homework contain it at the beginning.

[10 points each question]

Either prove or disprove each of the following statements. For those which you prove, be complete in your proof: state clearly what it is what you’re trying to prove, and give sufficient justification for each step so that someone with a reasonable amount of mathematical ability, who had never seen your proof before, could pick it up and understand what was being proven and be convinced by the proof.

1. For all integers a, b , and c : If $a|b$ and $a|c$ then $a|(2b + 3c)$.
2. For all integers a, b , and c : If $a|c$ and $b|c$ then $ab|c$.
3. For all integers a and b : If $a|12b$ then $a|12$ or $a|b$.
4. The rational numbers are closed under addition.
5. For all integers $m > 2$: $m^2 - 1$ is not prime.
6. For all integers a, b , and c : If $a|(b + c)$ then $a|b$ or $a|c$.
7. The sum of any three consecutive integers is divisible by 3.
8. For any integer n : $4|n(n^2 - 1)(n + 2)$
9. For all integers n : $n^2 \equiv 0 \pmod{4}$ or $n^2 \equiv 1 \pmod{4}$
10. For all integers m, n : If $m \equiv n \pmod{7}$ then $m \equiv n \pmod{14}$.