

MATH 232 Discrete Math

Homework 3

Basic Information

This assignment is due in Gradescope by 10 PM on the dates below.

Make sure you understand MHC [honor code](#) and have carefully read and understood the additional information on the [class syllabus](#) and the [grading rubric](#). I am happy to discuss any questions or concerns you have!

You are always welcome to ask me for small hints or suggestions on problems.

Problems

Reading Problem 3M (Due: Sunday, February 15)

You will read about the Division Algorithm and greatest common divisors (GCD) for Monday's class. Fill in the following table (it is also on page 415 of MR):

a	b	gcd(a,b)	Remainder r	gcd(b,r)
44	12			
75	21			
50	33			

Wednesday Problems HW3 (Due: Wednesday, February 18)

For problems 1-6 prove or disprove each of the following statements. Be sure to use the techniques and proof-writing guidelines we have talked about in class.

1. For all $x \in \mathbb{R}$ we have $x^2 + 1 = (x + 1)^2$.
2. There exists an integer n so that $n > 3$ and $n < -5$.
3. There exists an $x \in \mathbb{Z}$ so that for all $y \in \mathbb{Z}$ we have $y^2 > x$.
4. For all $y \in \mathbb{Z}$ there exists an $x \in \mathbb{Z}$ such that $x + y = 0$.

5. If x is an odd integer and y is an odd integer, then $x + y$ is an even integer.
6. Suppose a , b , and c are integers. If $a \mid b$ and $a \mid c$ then $a \mid (b + c)$
7. Prove the following statement by (a) writing down its contrapositive and then (b) proving the contrapositive.

Let $a \in \mathbb{Z}$. If $3a + 2$ is odd then a is odd.

Reading Problem 3F (Due: Thursday, February 19)

Find an example of functions f and g so that $g \circ f$ is surjective, and g is surjective, but f is not surjective. Your example can be ANY functions f and g . (This is one of the examples mentioned on page 333 of MR.)