CISC-102 FALL 2016

HOMEWORK 5

Please work on these problems and be prepared to share your solutions with classmates in class next week. Assignments will **not** be collected for grading.

Readings

Read sections 11.1, 11.2, 11.3, 11.4, and 11.5 of *Schaum's Outline of Discrete Mathematics*.

Read section 6.1, and 6.2 of *Discrete Mathematics Elementary and Beyond*.

Problems

(1) Evaluate
   (a) $|3 - 7|$
   (b) $|1 - 4| - |2 - 9|$
   (c) $| - 6 - 2| - |2 - 6|$

(2) Find the quotient q and remainder r, as given by the Division Algorithm theorem for the following examples.
   (a) a = 500, b = 17
   (b) a = -500, b = 17
   (c) a = 500, b = -17
   (d) a = -500, b = -17

(3) Show that $c|0$, for all $c \in \mathbb{Z}, c \neq 0$.

(4) Let $a, b, c \in \mathbb{Z}$ such that $c|a$ and $c|b$. Let r be the remainder of the division of b by a, that is there is a $q \in \mathbb{Z}$ such that $b = qa + r, 0 \leq r < |b|$. Show that under these condition we have $c|r$.

(5) Let $a, b \in \mathbb{Z}$ such that $2|a$. (In other words a is even.) Show that $2|ab$.

(6) Let $a \in \mathbb{Z}$ show that $3|a(a + 1)(a + 2)$, that is the product of three consecutive integers is divisible by 3.

(7) Use induction to prove the following propositions.
   (a) $n^3 + 2n$ is divisible by 3, for all $n \in \mathbb{N}, n \geq 1$.