Math 320 - Dr. Miller - HW #1: Proof Review via Divisibility - Due **Friday, Aug. 31, 2018**

Homework (HW) assignments in this course will be a mix of original problems and problems from our book. When original problems are assigned, I post a PDF version of the question sheet on our course web page, so you can access it if you lose or miss the physical copy. Work ALL problems on your own paper, but staple the question sheet to the front of your assignment when you hand it in. **ALWAYS LEAVE ROOM FOR MY COMMENTS.**

On the day the assignment is due, put your HW in a pile on the front desk before class starts. It counts as late - so potentially no credit! - if it's not turned in at the start. At the end of the semester, your overall HW percentage on all assignments (after dropping 1-2) is your course HW score. Remember: I don't typically accept late HW or make-ups since that delays everyone else's feedback, but you do get those 1-2 FREE "drops" to allow for being sick, traveling, special events, etc.; you can also hand in HW early.

I try to return graded assignments on our next class day, but such a fast turn-around isn't always possible, especially in a class that involves as much verbal work as this one. Do the math: for 12 students, spending just 5 minutes to read and comment on each person's Proof #1 requires one hour of grading time for that problem alone, and most proofs you'll write deserve more than 5 minutes of consideration from me. For efficiency, I pick and choose only some problems to grade (they'll be circled, with a score nearby when you get your HW back), but the act of learning occurs as you do the entire assignment, regardless of whether each piece is graded or not.

And now the actual assignment: Work on your own paper and leave room for my comments. All text problems come from p.9, Section 1.1.

1. Tasks involving basic styles of proof (direct, contrapositive, biconditional, etc.) and disproof:
   (a) Work Problem #2, then write the statement that you have just DISPROVED.
   (b) Work Problem #5, all three parts.
   (c) An incomplete statement is given below. Choose correctly in the proposed hypothesis to make the statement true, then prove it:
   Let $a, b, c \in \mathbf{Z}$. If a does(?)/does not(?) divide b and a does(?)/does not(?) divide c, then a does NOT divide $b + c$.
   (d) Work Problem #6a, writing your proof in correct style.

2. Tasks involving the Division Algorithm:
   (a) Work Problem #3bcde (the author wants a as the dividend and b as the divisor in each part).
   (b) Prove: For every $n \in \mathbf{Z}$, n^4 is divisible by 3 or has remainder 1 on division by 3.

3. Use the Principle of Mathematical Induction (PMI) to prove: $3 \mid 17^{k+2} - 8^k$ for all $k \in \mathbf{Z}^+$.

Staple this page to the front of your assignment, and to leave me plenty of room for comments.