Part I (due Monday, September 7 at the beginning of class)

We've seen the definitions of even and odd already, and we discussed "divides" in the context of even, but we can generalize that concept beyond even, as we've played with a bit already:

Definition 1. *Let m and n be integers. Then m* divides *n (notation: $m|n$) if there is an integer k such that $mk = n$. When $m|n$, we also say that n is* divisible by *m, m* is a factor of *n, or n* is a multiple of *m.*

Example 1. The integer 5 divides the integer 10 since $5(2) = 10$. Here, 5 plays the role of m in the definition of divides, 10 plays the role of n, and 2 plays the role of k.

Reading Questions

1. Write 6 good examples in the style of Example 1 above illustrating all the aspects of the definition of divides. Make sure to include an example of a number that is divisible by 0, an example where a number divides zero, and some examples that involve negative numbers.
2. Write at least 3 illuminating nonexamples of divides, i.e., examples of numbers m and n such that m does not divide n (notation: $m \nmid n$).

Part II: Exercises (for presenting Monday, September 7)

1. On the pink Mathematical Statements: Conjunctions and Disjunctions:
   (a) In Example 1, look for the one other statement that's false. Don't spend an inordinate amount of time on this.
   (b) Try Example 2.
2. Assign the following into groups of statements that have the same meaning.
   (a) $P \vee Q$
   (b) P and Q
   (c) At least one of the following is true: P, Q.
   (d) All of the following are true: P, Q.
   (e) Each of the following is true: P, Q.
   (f) Some of $\{P, Q\}$ are true.

Part III: Problems (due Friday, September 11, at the beginning of class)

1. Let P, Q, and R be statements. For each of the following, construct a truth table to prove the result (for your proof, you should introduce the statements in a sentence, then give the truth table, and then write a concluding sentence). Remember that to show two statements are logically equivalent, we just need to show that they have the same truth values/truth sets.
   (a) $(P \vee Q) \vee R$ is logically equivalent to $P \vee (Q \vee R)$
   (b) $P \wedge (Q \wedge R)$ is logically equivalent to $(P \wedge Q) \wedge (P \wedge R)$
   (c) $\neg(P \vee Q)$ is logically equivalent to $(\neg P) \wedge (\neg Q)$