MATH 2001
QUIZ 11

(1) (1 pt) Write your name in the top right corner of the page.

(2) (3 pts each) Complete each of the following definitions. (If you don't like how my sentences start, feel free to write your own, but your statement must be complete (define all your variables etc.).

   (a) Let A be a set, then R is a *relation* on A if

   $$R \subseteq A \times A.$$

   (b) Let R be a relation on A, then R is *transitive* if

   whenever $(a, b), (b, c) \in R$, then $(a, c) \in R$.

   (c) If R is an equivalence relation on A and $a \in A$, then the *equivalence class* of a is

   $$[a] = \{b \in A : (a, b) \in R\}$$

   (Set-builder notation is sufficient.)

(3) (3 pts each) Let $A = \{4, 9, 11\}$ and let R be the relation on A defined by
   $$R = \{(a, b) : 3 \mid (a - b) \text{ or } 3 \mid (a + b)\}.$$

   (a) Write out the relation R explicitly (list all of the elements of R in set notation).

   $$R = \{(4, 4), (9, 9), (11, 11), (4, 11), (11, 4)\}$$

   (b) Is R an equivalence relation? If **yes**, write out all of the equivalence classes of R. If **no**, give a brief explanation of why not (e.g. give a counter example).

   Yes.
   $$[4] = [11] = \{4, 11\}$$
   $$[9] = \{9\}$$