MATH 250 HANDOUT 16 - EQUIVALENCE RELATIONS

(1) Which of the following are equivalence relations? (Which are reflexive, symmetric, or transitive?)
   (a) Let S be the collection of all sets and say that $A \sim B$ if there is a bijection from A to B.
   (b) Let S be the collection of all sets and say that $A \sim B$ if there is a surjection from A to B.
   (c) Let S be the collection of all sets and say that $A \sim B$ if there is an injection from A to B.
   (d) Let S be the collection of all sets and say that $A \sim B$ if $A \cap B$ is empty.
   (e) Let x and y be real numbers and define $x \sim y$ if $x - y \in \mathbb{Q}$.
   (f) Let x and y be real numbers and define $x \sim y$ if $x = 1$ or $y = 1$.
   (g) Let x and y be real numbers and define $x \sim y$ if $x = 1$ or $y = -1$.
   (h) Let $\mathbb{Q}[x]$ be the set of polynomials with rational coefficients. Say that $f \sim g$ if their derivatives are equal.
   (i) Say that $f \sim g \in Fun(\mathbb{R}, \mathbb{R})$ are equivalent if there exists an interval (a, b) such that $a < 0 < b$ and such that $f(x) = g(x)$ for all $x \in (a, b)$.
   (j) Say that $f \sim g \in Fun(\mathbb{R}, \mathbb{R})$ are equivalent if there exists an interval (a, b) such that $a < b$ and $f(x) = g(x)$ for all $x \in (a, b)$.
   (k) Say that $f \sim g \in Fun(\mathbb{R}, \mathbb{R})$ are equivalent if there exists an interval (a, b) such that $f(x) = g(x)$ for all $x \in (a, b)$.
   (l) Say that two power series f and g are related if all but finitely many of their coefficients are the same.
   (m) Say that two power series f and g are related if at least one of their coefficients are the same.
   (n) Say that two power series f and g are related if $f - g$ is a polynomial.

   Answers (please circle):

   (a) R S T

   (b) R S T

   (c) R S T

   (d) R S T

   (e) R S T

   (f) R S T

   (g) R S T

   (h) R S T

(i) R S T

(j) R S T

(k) R S T