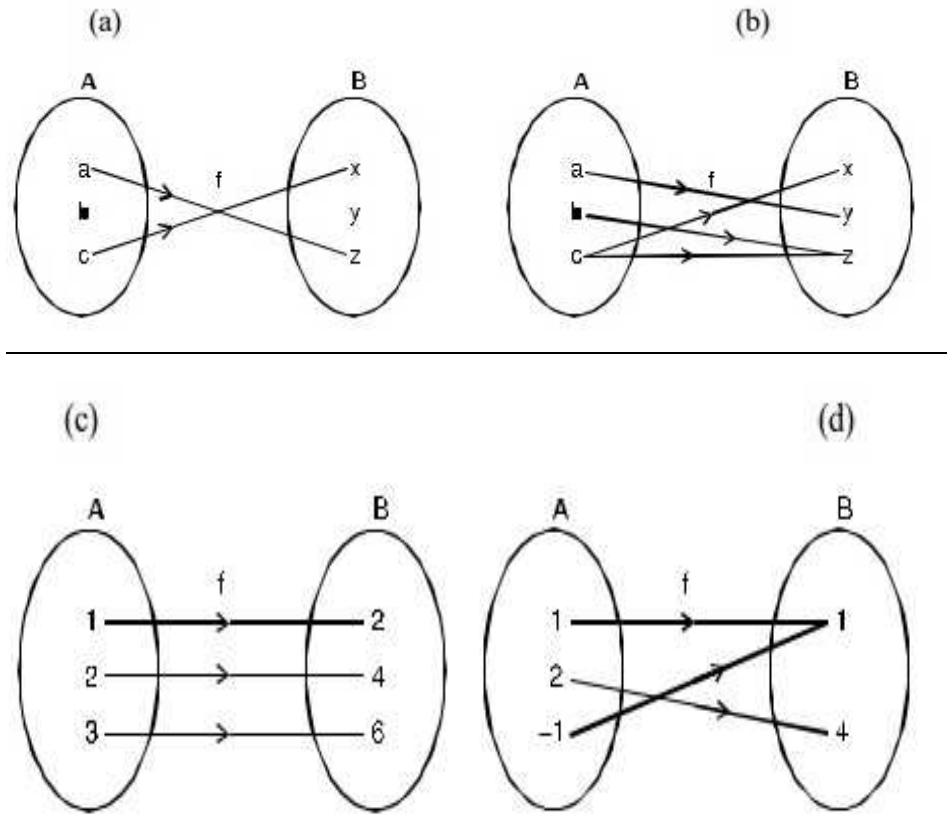
Tutorial 8

1. State whether each of the following relations represent a function or not:



2. "A function f: A→B is bijective or one-to-one correspondent if and only if **f** is both injective and surjective." Prove that a function f: R→R defined by f(x) = 2x–3 is a bijective function.

3. Let f be the function from {a, b, c} to {1, 2, 3} such that f (a) = 2, f (b) = 3, and f (c) = 1. Is f invertible, and if it is, what is its inverse?

4. Let f1 and f2 be functions from R to R such that f1(x) = x^2 and f2 (X) = x – x^2 . What are the functions f1 + f2 and f1 f2?

   (a) 2x and x^2-x^3

   (b) x^{2+2x} and $x^2(x-x^2)$

   (c) x and x^3 –x^4

   (d) None of the above.

5. Let f and g be the function from the set of integers to itself, defined by f(x) = 2x + 1 and g(x) = 3x + 4. Then the composition of f and g is _____
   a) 6x + 9
   b) 6x + 7
   c) 6x + 6
   d) 6x + 8

6. Consider the set of all functions f: {0,1, … ,2014} → {0,1, … ,2014} such that f(f(i)) = i, for all $0 \leq i \leq 2014$. Consider the following statements:

   P. for each such function it must be case that for every I, f(i)=i.

   Q. For each such function it must be case that for some I, f(i)=i

   R. Each such function must be onto.

   Which one of the following is CORRECT?
   (A) P, Q and R are true
   (B) Only Q and R are true
   (C) Only P and Q are true
   (D) Only R is true.

7. Explain why the following define functions.

   a) The formula for converting degree measure into radian measure is given by r = (π/ 180)* d.

   b) Let P(x) denote the refund/income tax payment calculated on a tax form for a given year that is owed to/by the person whose social security number is x.

8. Show that y = f(x) = x/ x + 3 is one-to-one onto its range and determine the range.