SRM Institute of Science and Technology
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Tutorial sheet - 3

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Course Code &Title: 18MAB302T-Discrete Mathematics for Engineers
Year & Sem: III/V

Q. No	Questions	Answer keys
1	For the function $F: \{1,2,3,4,5\} \to \{a,b,c,d,e\}$ defined as $F(1) = a, F(2) = b, F(3) = b, F(4) = d, F(5) = c$, identify domain($F$),codomain($F$), range($F$), $F^{-1}(a)$, $F^{-1}(\{a,b,c\})$ and$F^{-1}(e)$.	
2	If the function f is defined by $f(x) = x^2 + 1$ on the sets {-3, -2, -1, 0 , 1, 2, 3}, find the range of f.	{10, 5, 2, 1}
3	Let $f: X \to Y$ and $g: Y \to Z$ be two bijective functions. Show that $(g \circ f)^{-1}$ exists and$(g \circ f)^{-1} = f^{-1} \circ g^{-1}$.	
4.	For the functions $f(x) = x^2 - 4$ and $g(x) = \sqrt{(x+1)}$, find $f(g(x)), g(f(x)), (f \circ f)(x)$, and $(g \circ g)(x)$.	
5.	If $f, g: R \to R$ where $f(x) = ax + b, g(x) = 1 - x + x^2$and $(g \circ f)(x) = 9x^2 - 9x + 3$. Find the values of a and b.	$a = 3, b = -1$
6.	State TRUE or FALSE with proper justification for each of the following statements: (a) Every function is a relation but the converse is not true. (b) If $\lvert A \rvert = n$ and $\lvert B \rvert = m$, the number of different functions $f : A \to B$ is mn. (c) Any one-one function from A to B is a bijective function from A to $f(A)$.	(a) True, (b) False, (c) True
7.	State which of the following are injections, surjections or bijections from R into R, where R is the set of all real numbers i. f(x) = -2x ii. g(x) = $x^2 - 1$	i. bijection ii. neither injection nor surjection.
8.	Let $f: A \to B$ be a function. Prove that f^{-1} is a function from range of f to A if and only if f is one-to-one.	
9	Let$A = \{a,b,c\}$ $B = \{x,y,z\}$and$C = \{r,s,t\}$.Let$f: A \to B$and $g: B \to C$bedefinedby$f = \{(a,y),(b,x),(c,y)\}andg = \{(x,s),(y,t),(z,r)\}$. Find (a) Composition function $g \circ f: A \to C$ (b) Im(f),Im(g)andIm($g \circ f$)	$g \circ f = \{(a,t),(b,s),(c,t)\}$ $\mathrm{Im}(g \circ f) = \{s,t\}$
10	Let $f: X \to Y$ and $g: Y \to Z$ be functions. We can define the composition of $f$and g to be the function $g \circ f: X \to Z$ which the image of each$x \in X$ is $g(f(x))$. (a) If f and g are both injective, must$g \circ f$ be injective? Explain. (b) If f and g are both surjective, must$g \circ f$ be surjective?	

	Explain.	