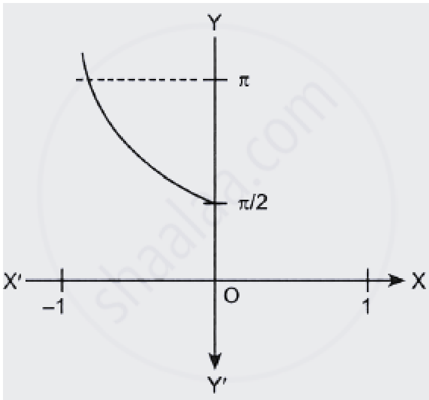
ANSWER KEY

	SECTION A
Q.NO.	**ANSWERS**
1	**d**
2	**a**
3	**a**
4	**d**
5	**b**
6	**c**
	SECTION B
7	= sin-1 ((sin x)/√2 + (cos x)/√2) if -π/4 < x < π/4 $=\sin^{-1}\left(\sin x\cos\frac{\pi}{4}+\cos x\sin\frac{\pi}{4}\right)$ if $-\frac{\pi}{4}+\frac{\pi}{4}<x+\frac{\pi}{4}<\frac{\pi}{4}+\frac{\pi}{4}$ $=\sin^{-1}\left(\sin\left(x+\frac{\pi}{4}\right)\right)$ if $0<\left(x+\frac{\pi}{4}\right)<\frac{\pi}{2}$ i.e. principal values $=\left(x+\frac{\pi}{4}\right)$ **Or**  Range of $\cos^{-1}$ x is [0, π].
8	The argument $\frac{3\pi}{5}\notin\left[\frac{-\pi}{2},\frac{\pi}{2}\right]$ $\sin^{-1}\sin\left(\pi-\frac{2\pi}{5}\right)$ $\sin^{-1}\sin\left(\frac{2\pi}{5}\right)=\frac{2\pi}{5}$
	SECTION C

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$-1 \leq (x^2 - 4) \leq 1$

$\Rightarrow 3 \leq x^2 \leq 5$

$\Rightarrow \sqrt{3} \leq |x| \leq \sqrt{5}$

$\Rightarrow x \in [-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$, So, required domain is $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$

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Given $f: N \to N$ defined such that $f(n) = \begin{cases} \dfrac{n+1}{2}, & \text{if } n \text{ is odd} \\ \dfrac{n}{2}, & \text{if } n \text{ is even} \end{cases}$

Let $x, y \in N$ and let they are odd then

$$f(x) = f(y) \Rightarrow \frac{x+1}{2} = \frac{y+1}{2} \Rightarrow x = y$$

If $x, y \in N$ are both even then also

$$f(x) = f(y) \Rightarrow \frac{x}{2} = \frac{y}{2} \Rightarrow x = y$$

If $x, y \in N$ are such that x is even and y is odd then

$$f(x) = \frac{x+1}{2} \text{ and } f(y) = \frac{y}{2}$$

Thus, $x \neq y$ for $f(x) = f(y)$

Let $x = 6$ and $y = 5$

We get $f(6) = \dfrac{6}{2} = 3$, $\quad f(5) = \dfrac{5+1}{2} = 3$

$\therefore \quad f(x) = f(y)$ but $x \neq y$

So, $f(x)$ is not one-one.

Or

$R = \{(a,b) : a > b, a, b \in R\}$

Reflexive: Let $(a,a) \in R$

$\Rightarrow a > a$ (not possible)

$\Rightarrow R$ is not reflexive.

Symmetric: Let $(a,b) \in R \Rightarrow a > b$

but $b \not> a$

$\Rightarrow (b,a) \notin R \Rightarrow R$ is not sym

Transitive: Let (a,b) & $(b,c) \in R$

$\Rightarrow a > b$ & $b > c$

$\Rightarrow a > b > c$

$\Rightarrow a > c$

$\Rightarrow (a,c) \in R$

$\Rightarrow R$ is transitive

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SECTION D

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11	$A = \{a, b, c\}$ $n(A) = 3 = m$ $B = \{d, e, f\}$ $n(B) = 3 = n$ (i) No of relations $= 2^{m \times n} = 2^{3 \times 3} = 2^{9} = 512$ (d) (ii) No. of functions $= n^{m} = 3^{m} = 3^{3} = 27$ (b) (iii) No. of bijective fn (exist if $n(A) = n(B)$) $= n!$ or $m! = 3! = 6$ (b) (iv) No of reflexive fn $2^{n^2 - n} = 2^{3^2 - 3} = 2^{6} = 64$ (c) or No. of equivalance relation on $B = \{d, e, f\}$ $R_1 = \{(e,e)(d,d)(f,f)\}$ $R_2 = \{(e,e)(d,d)(f,f)\}$ likewise are 5 (a)
	SECTION E
12	For any $(a, b) \in N \times N$; $ab = ba$ $\Rightarrow (a, b) R (a, b)$ Thus R is reflexive Let $(a, b) R (c, d)$ for any $a, b, c, d \in N$ $\therefore ad = bc$ $\Rightarrow cb = da \Rightarrow (c, d) R (a, b)$ $\therefore$ R is symmetric Let $(a, b) R (c,d)$,d and $(c, d) R (e, f)$ for $a, b, c, d, e, f \in N$ Then $ad = bc$ and $cf = de$ $\Rightarrow a d c f = b c d e$ or $af = be \Rightarrow (a, b) R (e, f)$ $\therefore$ R is transitive So R is an equivalence Relation **[2,6]={(2,6),(6,2),(9,3),(12,4)……..}**

13	**Reflexivity :** For Reflexivity, we need to prove that-
	
	(a, a) $\in$ R
	
	Here (1,1), (2,2), (3,3), (4,4), (5,5), (6,6), (7,7) all $\in$ R
	
	From the relation R it is seen that R is reflexive.
	
	Symmetric: For Symmetric, we need to prove that-
	
	If (a, b) $\in$ R, then (b, a) $\in$ R
	
	From the relation R, it is seen that R is symmetric.
	
	Transitive: For Transitivity, we need to prove that-
	
	If (a, b) $\in$ R and (b, c) $\in$ R, then (a, c) $\in$ R
	
	[I (a, b) are odd and (b, c) are odd then (a, c) are also odd numbers]
	
	From the relation R, it is seen that R is transitive too.
	
	Also, from the relation R, it is seen that {1, 3, 5, 7} are related with each other only and {2, 4, 6} are related with each other .
	
	Or
	
	$f(x) = \sqrt{16-x^2}$
	for f to be well defined, values of x
	$16-x^2 \geq 0$
	$(4-x)(4+x) \geq 0$
	$- \quad + \quad -$
	$-4 \quad 4$
	$x \in [-4,4]$
	Let $y = \sqrt{16-x^2}$, $y \geq 0$
	$x^2 = 16-y^2$
	$16-y^2 \geq 0$
	$y \in [-4,4]$ but $y \geq 0$
	$\therefore y \in [0,4]$
	$\therefore f : [-4,4] \to [0,4]$ is a well defined fn.
	Also, Let $x_1, x_2 \in$ Domain such that $f(x_1) = f(x_2)$
	$\sqrt{16-x^2} = \sqrt{16-y^2}$
	$x = \pm y$
	$\Rightarrow f$ is not one-one
	Next, $f(a) = 7$
	$\Rightarrow \sqrt{16-a^2} = 7$
	$16-a^2 = 7^2$
	$16-49 = a^2$
	$-25 = a^2$
	not possible
	$\Rightarrow$ for no value of a, $f(a) = 7$.