HOLIDAY HOME WORK CLASS-12

INVERSE TRIG. FUNCTIONS

1. If $\sin^{-1}(1-x) - 2\sin^{-1} x = \frac{\pi}{2}$, find the value of x.
2. Find the value of $\sec(\tan^{-1}(-\sqrt{3}))$
3. Show that $\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{4}{5} + \tan^{-1}\frac{63}{60} = \pi$
4. Prove that $\tan^{-1}\left(\frac{\sqrt{1+x}-\sqrt{1-x}}{\sqrt{1+x}+\sqrt{1-x}}\right) = \frac{\pi}{4} - \frac{1}{2}\cos^{-1} x$, $\frac{-1}{\sqrt{2}} \leq x \leq 1$
5. If $\cos^{-1} x + \cos^{-1} y + \cos^{-1} z = \pi$, prove that $x^2 + y^2 + z^2 + 2xyz = 1$
6. Show that $\tan(\frac{1}{2}\sin^{-1}\frac{3}{4}) = \frac{4-\sqrt{7}}{3}$
7. Show that $\sin^{-1}\frac{12}{13} + \cos^{-1}\frac{4}{5} + \tan^{-1}\frac{63}{16} = \pi$
8. Simplify: $\sin^{-1}(\frac{3x+4\sqrt{1-x^2}}{5})$
9. Prove that $2\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{7} = \tan^{-1}\frac{31}{17}$
10. Simplify $\tan^{-1}\left[\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right]$
11. Solve for x: $3\sin^{-1}(2x/1+x^2) - 4\cos^{-1}(1-x^2/1+x^2) + 2\tan^{-1}(2x/1-x^2) = \prod/3$

RELATIONS & FUNCTIONS

1. If the functions f: **R** → **R** given by f(x) = x^2 + 3x + 1 and g : **R** → **R** is given by g(x) = 2x – 3, find $f \circ g$ and $g \circ f$
2. Let A = {1, 2, 3}, B = {4, 5, 6, 7} and let f = {(1, 4), (2, 5), (3, 6)} be a function from A to B. whether f is one-one or not.
3. If f(x) = x + 7 and g(x) = x – 7, x∈ **R**, find $f \circ g(7)$
4. Let f : **R** –{-3/5)→**R** defined by f(x) = $\frac{2x}{5x+3}$ is invertible. Find inverse of f.
5. Let f: N → R be a function defined as f(x)= $4x^2$ + 12x + 15. Show that f: N→Range f is invertible. Also find the inverse of f
6. Prove that the functioj f:N→N, defined by f(x)=x^2 + x +1 is one –one but onto.
7. Show that the relation R in the set A= {x:x ∈ W,0 ≤ x ≤ 12 } given by R={(a,b): (ab) is a multiple of 4 } is an equivalence relation. Also find the set of all elements related to 2
8. Let * be a binary operation defined on NxN , by (a,b) * (c,d) = (a+c,b+d). Show that *is commutative and associative. Also find the identity element for *on NxN , if any.
9. Examine which of the following is a binary operation.
   (i) a*b=$\frac{a+b}{2}$, a,b∈N
   (ii) a*b =$\frac{a+b}{2}$, a,b ∈Q, for the binary operation check the commutative and associative property.