

RD Sharma Solutions for Class 12 Maths Chapter 4 Inverse Trigonometric Functions

EXERCISE 4.4

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1. Find the principal value of each of the following:
(i) sec<sup>-1</sup> (-√2)
(ii) sec<sup>-1</sup> (2)
(iii) sec<sup>-1</sup> (2 sin (3\pi/4))
(iv) sec<sup>-1</sup> (2 tan (3π/4))
Solution:
(i) Given sec<sup>-1</sup> (-\sqrt{2})
Now let y = \sec^{-1}(-\sqrt{2})
Sec y = -\sqrt{2}
We know that sec \pi/4 = \sqrt{2}
Therefore, -sec (\pi/4) = -\sqrt{2}
= \sec(\pi - \pi/4)
= \sec(3\pi/4)
Thus the range of principal value of sec<sup>-1</sup> is [0, \pi] - {\pi/2}
And sec (3\pi/4) = -\sqrt{2}
Hence the principal value of sec<sup>-1</sup> (-V2) is 3\pi/4
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(ii) Given sec<sup>-1</sup> (2)
Let y = \sec^{-1} (2)
Sec y = 2
= Sec \pi/3
Therefore the range of principal value of sec<sup>-1</sup> is [0, \pi] - {\pi/2} and sec \pi/3 = 2
Thus the principal value of sec<sup>-1</sup> (2) is \pi/3
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(iii) Given sec<sup>-1</sup> (2 sin (3\pi/4))
But we know that sin (3\pi/4) = 1/\sqrt{2}
Therefore 2 sin (3\pi/4) = 2 \times 1/\sqrt{2}
2 sin (3\pi/4) = \sqrt{2}
Therefore by substituting above values in sec<sup>-1</sup> (2 \sin (3\pi/4)), we get
Sec<sup>-1</sup> (\sqrt{2})
Let Sec<sup>-1</sup> (\sqrt{2}) = \gamma
Sec \gamma = \sqrt{2}
Sec (\pi/4) = \sqrt{2}
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Therefore range of principal value of sec⁻¹ is $[0, \pi] - {\pi/2}$ and sec $(\pi/4) = \sqrt{2}$ Thus the principal value of sec⁻¹ (2 sin $(3\pi/4)$) is $\pi/4$.

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(iv) Given sec<sup>-1</sup> (2 tan (3\pi/4))
But we know that tan (3\pi/4) = -1
Therefore, 2 tan (3\pi/4) = 2 × -1
2 tan (3\pi/4) = -2
By substituting these values in sec<sup>-1</sup> (2 tan (3\pi/4)), we get
Sec<sup>-1</sup> (-2)
Now let y = Sec<sup>-1</sup> (-2)
Sec y = -2
- sec (\pi/3) = -2
= sec (\pi - \pi/3)
= sec (2\pi/3)
Therefore the range of principal value of sec<sup>-1</sup> is [0, \pi] – {\pi/2} and sec (2\pi/3) = -2
Thus, the principal value of sec<sup>-1</sup> (2 tan (3\pi/4)) is (2\pi/3).
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