

### Trigonometry

1. write the principle value of  $\cos^{-1} \left( \cos \frac{7\pi}{6} \right)$
2. Prove the following:

$$\cot^{-1} \left( \frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}} \right) = \frac{x}{2}, x \in \left( 0, \frac{\pi}{4} \right)$$

3. If the sum of the lengths of the hypotenuse and a side of a right-angled triangle is given, show that the area of the triangle is maximum when the angle between them is  $\frac{\pi}{3}$ .