1. Use the identity $\sin(x + y) = \sin x \cos y + \cos x \sin y$ to establish the following identities.
   (i) $\sin(x - y) = \sin x \cos y - \cos x \sin y,$
   (ii) $\sin 2x = 2 \sin x \cos x.$
2. Show $\cos(180^\circ - \theta) = -\cos \theta.$
3. Establish an identity for $\sin 3x$ in terms of $\sin x.$
4. Solve each of the following equations for $0 \leq x \leq 2\pi.$
   (i) $\cos x = 0.3,$
   (ii) $2 \sin^2 x + 3 \cos x = 3,$
   (iii) $\sin 2x = \cos x.$
5. Given $t = \tan \frac{1}{2}x$ show that $\cos x = \frac{1 - t^2}{1 + t^2}.$
6. If the value of $x$ is such that $\csc x = \sqrt{2}$ and $0 \leq x \leq \pi/2$ find the values of $\sin x,$ $\cos x,$ and $\tan x.$
7. Express $\sin(2\theta + \pi/3)$ in terms of $\sin \theta$ and $\cos \theta.$
8. Express
   (i) $\sin 4\theta$ as $\cos \theta$ times an expression involving $\sin \theta,$
   (ii) $\sin 5\theta$ as an expression involving $\sin \theta.$
9. Express $\cos 3t - 2 \sin 3t$ in the form (i) $A \sin(3t - \phi)$ and (ii) $A \cos(3t + \phi)$ with $\phi \geq 0.$