Exercises.

(1) Solve each of the following equations. You should give the general solution and then find those solutions that lie in the interval $[0, 2\pi)$.
   (a) $\cos x = \dfrac{\sqrt{3}}{2}$
   (b) $\sin x = \dfrac{\sqrt{2}}{2}$
   (c) $\cos x = -\dfrac{1}{2}$
   (d) $\sin x = -\dfrac{\sqrt{3}}{2}$
   (e) $2\cos^2 x + 3\cos x + 1 = 0$
   (f) $2\sin^2 x - 3\sin x + 1 = 0$
   (g) $\sin 2x = \dfrac{\sqrt{3}}{2}$
   (h) $\cos(3x - \pi) = 0$

(2) **Extra Credit:**
   (a) Prove that
$$\cos 2x = 2\cos^2 x - 1$$
   (b) Solve the equation:
$$\cos 2x = \frac{1}{2}$$

(3) **Extra Credit:** Given that $\sin \dfrac{\pi}{8} = \dfrac{\sqrt{2-\sqrt{2}}}{2}$
   (a) Find $\cos \dfrac{\pi}{8}$.
   (b) Find all solutions of the equation
$$8\sin^4 x - 8\sin^2 x + 1 = 0 \tag{1}$$
   (c) Find all solutions of equation (1) that lie in the interval $[0, 2\pi)$