I. Determine the amplitude, period, phase shift and vertical shift of the following then draw one cyle of the graph.

1. $f(x) = 4\sin(2x - \pi) + 1$

2. $g(x) = \dfrac{1}{2}\cos\left(\dfrac{x}{2} + \dfrac{\pi}{6}\right) - 2$

3. $h(x) = -3 + 2\sin\left(\dfrac{\pi}{2} - 2x\right)$

II. Evaluate the following.

1. $\cos^{-1} 0 - \csc^{-1}\left(-\dfrac{2\sqrt{3}}{2}\right)$

2. $\sin^{-1}\left(-\dfrac{\sqrt{2}}{2}\right)\cot^{-1}(-\sqrt{3})$

3. $\cos\left[\text{Arc}\tan\sqrt{3} + \text{Arc}\sec(-\sqrt{2}) + \text{Arc}\sin\left(-\dfrac{\sqrt{3}}{2}\right)\right]$

4. $\cos^{-1}\left(1 - 2\sin^2\dfrac{\pi}{14}\right)$

5. $\text{Arccot}\left[\cot\left(-\dfrac{\pi}{7}\right)\right]$

6. $\sin^{-1}\left(\cos\dfrac{19\pi}{9}\right)$

7. $\sec\left(\text{Arc}\cos\dfrac{3}{5} + \text{Arc}\sin 1\right)$

8. $\sin\left(\sin^{-1}\dfrac{2}{3} - \cos^{-1}\dfrac{1}{3}\right)$

III. Find the solution set.

1. $\text{Arc}\cos\left[\cos(-3)\right] - \text{Arc}\sin x = \dfrac{\pi}{2} + 3$

2. $\tan^{-1}\left(-\dfrac{\sqrt{3}}{3}\right) + 4\cot^{-1} x = \sec^{-1}(-2)$

3. $\sin^{-1} x - \cos^{-1} x = \dfrac{\pi}{6}$

4. $\text{Arc}\sin x + \text{Arc}\cos(1 - x) = 0$

5. $\cos^{-1} 1 + 2\sin^{-1} x = \tan^{-1}\dfrac{x}{\sqrt{1 - x^2}}$

IV. Do as indicated.

1. Show that $\tan^{-1} 2 + \cot^{-1}(-3) = \dfrac{5\pi}{4}$

2. Show that $\sin^{-1} x + \cos^{-1} x = \dfrac{\pi}{2}$ where $x \in [-1, 1]$

3. If $\theta = tan^{-1}\left(-\dfrac{3}{4}\right)$, find the exact value of $\sin 2\theta$ and $\sin\dfrac{\theta}{2}$

V. Solve the following

1. Faye is bored during her Mathematics 17 class. She looked out the window and saw Jet at an angle of depression of 45°. After ten minutes, faye looked out again the window and saw Jet, this time at angle of depression of 30°. If the window is 7 meters from the ground, what is the distance travelled by Jet?

2. A telephone pole on the slope of a hill casts a shadow of 20 feet down the hill. If the angle of elevation of the sun is 75° and the hill is inclined 45°, find the height of the telephone pole.

3. The adjacent sides of a parallelogram are 6 feet and 10 feet and they make an angle of 120° with each other. Find the length of the longer diagonal.

4. At a certain distance, Ayla measured the angle of elevation of the peak of a hill to be equal to 15°. After travelling 100 km. towards the hill, she found the angle of elevation of the peak of the hill to be 60°. What is the height of the hill?

5. From the top of a tower, the angle of depression of the top and the base of a shorter tower are 15° and 60° respectively. If the shorter tower is 100 meters high, how high is the taller tower?

6. A man standing at a certain distance from a wall observes that the angles of elevation of the top and bottom of a mural painting are 45° and 30° respectively. He advances 3 feet towards the wall and observes that the angles of elevation of the top and bottom of the painting become 60° and 45° respectively. Find the height of the painting.

Examples from CAT by Castillo et. al
Courtesy of manjologs