

Evaluate the following:

$$1. \sin x \Big|_{\frac{\pi}{6}}^{\frac{5\pi}{6}} = \sin \frac{5\pi}{6} - \sin \frac{\pi}{6}$$

$$\frac{1}{2} - \frac{1}{2} = \boxed{0}$$

$$3. \csc \theta \Big|_{\frac{\pi}{4}}^{\frac{7\pi}{4}} = \csc \frac{7\pi}{4} - \csc \frac{\pi}{4}$$

$$-\sqrt{2} - \sqrt{2}$$

$$\boxed{-2\sqrt{2}}$$

$$5. \sec \theta \Big|_{\frac{2\pi}{3}}^{\frac{4\pi}{3}} = \sec \frac{4\pi}{3} - \sec \frac{2\pi}{3}$$

$$-2 - -2$$

$$\boxed{0}$$

$$7. \cos^{-1} x \Big|_{\frac{\sqrt{3}}{2}}^{\frac{\sqrt{2}}{2}} = \cos^{-1} \left(\frac{\sqrt{2}}{2} \right) - \cos^{-1} \left(\frac{\sqrt{3}}{2} \right)$$

$$\frac{2\pi}{3} - \frac{\pi}{6} = \frac{4\pi}{6} - \frac{\pi}{6} = \frac{3\pi}{6} = \frac{\pi}{2}$$

$$\boxed{\frac{\pi}{2}}$$

$$9. \tan^{-1} \theta \Big|_{\frac{1}{3}}^{\frac{\sqrt{3}}{3}} = \tan^{-1} \left(\frac{\sqrt{3}}{3} \right) - \tan^{-1} \left(\frac{1}{3} \right)$$

$$\frac{\pi}{6} - \frac{\pi}{3} = \frac{\pi}{6} - \frac{2\pi}{6} = \frac{-\pi}{6}$$

$$\boxed{\frac{-\pi}{6}}$$

$$2. \cos \theta \Big|_{\frac{2\pi}{3}}^{\frac{5\pi}{6}} = \cos \frac{5\pi}{6} - \cos \frac{2\pi}{3}$$

$$-\frac{\sqrt{3}}{2} - -\frac{1}{2}$$

$$-\frac{\sqrt{3}}{2} + \frac{1}{2} = \boxed{\frac{1-\sqrt{3}}{2}}$$

$$4. \tan x \Big|_{\frac{\pi}{4}}^{\pi} = \tan \pi - \tan \frac{\pi}{4}$$

$$0 - 1$$

$$\boxed{-1}$$

$$6. \cot x \Big|_{\frac{\pi}{6}}^{\frac{5\pi}{4}} = \cot \frac{5\pi}{4} - \cot \frac{\pi}{6}$$

$$1 - \sqrt{3}$$

$$\boxed{1 - \sqrt{3}}$$

$$8. \sin^{-1} \theta \Big|_{\frac{\sqrt{2}}{2}}^{\frac{\sqrt{3}}{2}} = \sin^{-1} \left(\frac{\sqrt{3}}{2} \right) - \sin^{-1} \left(\frac{\sqrt{2}}{2} \right)$$

$$\frac{\pi}{3} - \frac{\pi}{4} = \frac{4\pi}{12} - \frac{3\pi}{12} = \frac{\pi}{12}$$

$$\boxed{\frac{\pi}{12}}$$

$$10. \cot^{-1} x \Big|_{\sqrt{3}}^1 = \cot^{-1} (1) - \cot^{-1} (\sqrt{3})$$

$$= \tan^{-1} (1) - \tan^{-1} \left(\frac{\sqrt{3}}{3} \right)$$

$$\frac{\pi}{4} - \frac{\pi}{6} = \frac{2\pi}{6} - \frac{\pi}{6} = \frac{\pi}{6}$$

$$\boxed{\frac{\pi}{6}}$$

11-12 If $f(x) = \cos^{-1}x$ and $g(x) = \sin x$, find the following. Quadrant I only.

11. $f\left(g\left(\frac{\pi}{3}\right)\right)$ $g\left(\frac{\pi}{3}\right) = \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$
 $f\left(\frac{\sqrt{3}}{2}\right) = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = \boxed{\frac{\pi}{6}}$ or $f\left(g\left(\frac{\pi}{3}\right)\right) = \cos^{-1}\left(\sin\left(\frac{\pi}{3}\right)\right)$
 $= \frac{\pi}{6}$

12. $f\left(g\left(\frac{\pi}{6}\right)\right)$ $g\left(\frac{\pi}{6}\right) = \sin \frac{\pi}{6} = \frac{1}{2}$
 $f\left(\frac{1}{2}\right) = \cos^{-1}\left(\frac{1}{2}\right) = \boxed{\frac{\pi}{3}}$

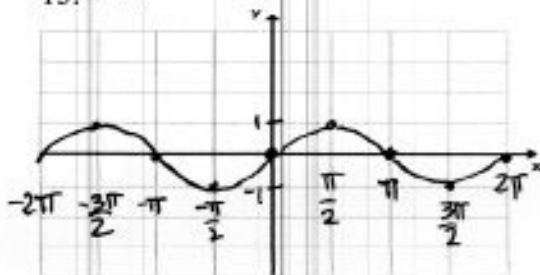
13-14 If $f(\theta) = \tan^{-1}x$ and $g(\theta) = \cot x$, find the following. Quadrant I only.

13. $f\left(g\left(\frac{\pi}{4}\right)\right)$ $g\left(\frac{\pi}{4}\right) = \cot \frac{\pi}{4} = 1$
 $f(1) = \tan^{-1}(1) = \boxed{\frac{\pi}{4}}$

14. $f\left(g\left(\frac{\pi}{3}\right)\right)$ $g\left(\frac{\pi}{3}\right) = \cot \frac{\pi}{3} = \frac{\sqrt{3}}{3}$
 $f\left(\frac{\sqrt{3}}{3}\right) = \tan^{-1}\left(\frac{\sqrt{3}}{3}\right) = \boxed{\frac{\pi}{6}}$

15-16 Graph the following. Label/scale axes.

15. $f(\theta) = \sin x$



16. $f(\theta) = \cos x$

