

**Math 1613 - Trigonometry**  
**Quiz #18 - 2011.10.18**  
**Solutions**

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1. Evaluate

$$\cos\left(\tan^{-1}(\sqrt{3}) + \sin^{-1}\left(\frac{1}{3}\right)\right)$$

Here, you may need to use the fact that  $\cos(A + B) = \cos(A)\cos(B) - \sin(A)\sin(B)$ .

So we first have

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

Next, we notice that:

(1)  $A = \tan^{-1}(\sqrt{3})$ , then  $\cos(A) = \frac{1}{2}$  and  $\sin(A) = \frac{\sqrt{3}}{2}$

(2)  $B = \sin^{-1}\left(\frac{1}{3}\right)$ , then  $\cos(B) = \frac{2\sqrt{2}}{3}$  and  $\sin(B) = \frac{1}{3}$

Thus, we have

$$\cos\left(\tan^{-1}(\sqrt{3}) + \sin^{-1}\left(\frac{1}{3}\right)\right) = \frac{1}{2} \cdot \frac{2\sqrt{2}}{3} - \frac{\sqrt{3}}{2} \cdot \frac{1}{3}$$