

$$10. \quad \text{TAN} \left[\overset{\alpha}{\sin^{-1} \frac{1}{3}} + \overset{\beta}{\frac{\pi}{3}} \right]$$

$$\downarrow \quad \text{TAN}(\alpha + \beta) = \frac{\text{TAN} \alpha + \text{TAN} \beta}{1 - \text{TAN} \alpha \text{TAN} \beta}$$

$$= \frac{\text{TAN}(\sin^{-1} \frac{1}{3}) + \text{TAN} \frac{\pi}{3}}{1 - \text{TAN}(\sin^{-1}(\frac{1}{3})) \text{TAN} \frac{\pi}{3}}$$

$$= \frac{\frac{\sqrt{2}}{4} + \sqrt{3}}{1 - \left(\frac{\sqrt{2}}{4}\right)(\sqrt{3})}$$

$$= \frac{4\left(\frac{\sqrt{2}}{4}\right) + 4(\sqrt{3})}{4(1) - 4\left(\frac{\sqrt{2}}{4}\right)(\sqrt{3})}$$

$$= \frac{\sqrt{2} + 4\sqrt{3}}{4 - \sqrt{6}}$$

$$= \frac{\sqrt{2} + 4\sqrt{3}}{4 - \sqrt{6}} \cdot \frac{4 + \sqrt{6}}{4 + \sqrt{6}}$$

$$= \frac{4\sqrt{2} + \sqrt{2} \cdot 6 + 16\sqrt{3} + 4\sqrt{3} \cdot 6}{16 - 6}$$

$$= \frac{4\sqrt{2} + \sqrt{2} \cdot 2 \cdot 3 + 16\sqrt{3} + 4\sqrt{3} \cdot 3 \cdot 2}{10}$$

$$= \frac{4\sqrt{2} + 2\sqrt{3} + 16\sqrt{3} + 12\sqrt{2}}{10}$$

$$= \frac{16\sqrt{2} + 18\sqrt{3}}{10}$$

$$\text{TAN}(\sin^{-1} \frac{1}{3})$$

$$\uparrow \quad p = \sin^{-1} \frac{1}{3}$$

$$\sin p = \sin(\sin^{-1} \frac{1}{3})$$

$$\sin p = \frac{1}{3}$$

$$\text{So } y=1, r=3$$

$$x^2 + y^2 = r^2$$

$$x^2 + 1^2 = 3^2$$

$$x^2 + 1 = 9$$

$$x^2 = 9 - 1$$

$$x^2 = 8$$

$$x = \pm \sqrt{8}$$

$$x = \pm 2\sqrt{2}$$

$$x = 2\sqrt{2}$$

$$\text{So TAN} = \frac{y}{x}$$

$$= \frac{1}{2\sqrt{2}}$$

$$= \frac{\sqrt{2}}{2(2)}$$

$$= \frac{\sqrt{2}}{4}$$

$$\frac{x}{y} = \frac{2\sqrt{2}}{1}$$

$$\frac{8\sqrt{2} + 9\sqrt{3}}{5}$$