

$$9. \sin \left[ \sin^{-1} \frac{8}{17} - \tan^{-1} \frac{15}{8} \right]$$

$$\left[ \sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta \right]$$

$$= \sin(\sin^{-1} \frac{8}{17}) \cos(\tan^{-1} \frac{15}{8}) - \cos(\sin^{-1} \frac{8}{17}) \sin(\tan^{-1} \frac{15}{8})$$

$$= \left(\frac{8}{17}\right) \left(\frac{8}{17}\right) - \left(\frac{15}{17}\right) \left(\frac{15}{17}\right)$$

$$= \frac{64}{289} - \frac{225}{289}$$

$$= \left( \frac{-161}{289} \right)$$

①  $\sin(\sin^{-1} \frac{8}{17})$   
 $\frac{8}{17}$

②  $\cos(\tan^{-1} \frac{15}{8})$   
 $P = \tan^{-1} \frac{15}{8}$   
 $\tan P = \tan \tan^{-1} \frac{15}{8}$

$\tan P = \frac{15}{8} \left( \frac{y}{x} \right)$   
 $\text{So } y = 15, x = 8$

$r^2 = x^2 + y^2$   
 $r^2 = 15^2 + 8^2$   
 $r^2 = 289$

$r = 17$   
 $\text{And } \cos = \frac{x}{r} = \frac{8}{17}$

④  $\sin(\tan^{-1} \frac{15}{8})$

$\sin = \frac{y}{r}$   
 $= \frac{15}{17}$

③  $\cos(\sin^{-1} \frac{8}{17})$

$P = \sin^{-1} \frac{8}{17}$   
 $\sin P = \sin(\sin^{-1} \frac{8}{17})$

$\sin P = \frac{8}{17}$   
 $\text{So } y = 8, r = 17$

$x^2 + y^2 = r^2$   
 $x^2 + 8^2 = 17^2$   
 $x^2 = 289 - 64$

$x^2 = 225$   
 $x = \pm \sqrt{225}$   
 $x = 15$

$\text{So } \cos = \frac{x}{r} = \frac{15}{17}$