

# FORMULA LIST

| CONDITION              | $\tan^{-1}x + \tan^{-1}y$                       |
|------------------------|---|
| $xy < 1$               | $\tan^{-1}\left(\frac{x+y}{1-xy}\right)$        |
| $x > 0, y > 0, xy > 1$ | $\pi + \tan^{-1}\left(\frac{x+y}{1-xy}\right)$  |
| $x < 0, y < 0, xy > 1$ | $-\pi + \tan^{-1}\left(\frac{x+y}{1-xy}\right)$ |

| CONDITION               | $\tan^{-1}x - \tan^{-1}y = \tan^{-1}x + \tan^{-1}(-y)$ |
|-------------------------|--|
| $xy > -1$               | $\tan^{-1}\left(\frac{x-y}{1+xy}\right)$               |
| $x > 0, y < 0, xy < -1$ | $\pi + \tan^{-1}\left(\frac{x-y}{1+xy}\right)$         |
| $x < 0, y > 0, xy < -1$ | $-\pi + \tan^{-1}\left(\frac{x-y}{1+xy}\right)$        |

•  $2 \tan^{-1}x =$   
 $= \tan^{-1}x + \tan^{-1}x$

$$\left\{ \begin{array}{l} \tan^{-1}\left(\frac{2x}{1-x^2}\right), \quad |x| \leq 1 \\ \pi + \tan^{-1}\left(\frac{2x}{1-x^2}\right), \quad x > 1 \\ -\pi + \tan^{-1}\left(\frac{2x}{1-x^2}\right), \quad x < -1 \end{array} \right.$$

•  $\tan^{-1}x = \sin^{-1}\left(\frac{x}{\sqrt{1+x^2}}\right)$