

Find the derivative of $\sin^{-1} x$ using the definition of the derivative.
 Let $y = \sin^{-1} x$. Then $\sin y = x$.
 Differentiate both sides with respect to x .



$$\cos y \cdot \frac{dy}{dx} = \frac{dx}{dx} = 1$$

$$\frac{dy}{dx} = \frac{1}{\cos y}$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$$

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$$\frac{d}{dx} \sqrt{1-x^2} = \frac{1}{2} (1-x^2)^{-1/2} \cdot (-2x) = \frac{-x}{\sqrt{1-x^2}}$$

$$\frac{d}{dx} \sqrt{1-x^2} = \frac{-x}{\sqrt{1-x^2}}$$

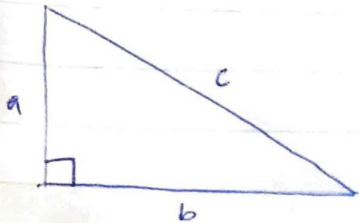
$$\frac{d}{dx} \sqrt{1-x^2} = \frac{-x}{\sqrt{1-x^2}}$$

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① $A = \frac{1}{2}ab$ $\sigma_a = \pm 1.5\%$ of a $\sigma_b = 1.5\%$ of b .

$$\frac{\partial A}{\partial a} = \frac{b}{2}, \quad \frac{\partial A}{\partial b} = \frac{a}{2}$$

$$\delta A = \frac{\partial A}{\partial a} \delta a + \frac{\partial A}{\partial b} \delta b.$$

$$\delta A = \frac{b}{2} \left[\pm \frac{1.5a}{100} \right] + \frac{a}{2} \left[\pm \frac{1.5b}{100} \right]$$

$$\delta A = \pm \frac{ab}{2} \left[\left[\pm \frac{1.5}{100} \right] + \left[\frac{1.5}{100} \right] \right]$$

$$\delta A = \pm \frac{ab}{2} \left[\frac{1.5 + 1.5}{100} \right]$$

$$= \pm \frac{ab}{2} \left(\frac{3}{100} \right)$$

$$\delta A = 3 \text{ Percent of } A$$

② $c = \sqrt{a^2 + b^2} = (a^2 + b^2)^{1/2}$

$$\delta c = \frac{\partial c}{\partial a} \delta a + \frac{\partial c}{\partial b} \delta b$$

$$\frac{\partial c}{\partial a} = \frac{1}{2} (a^2 + b^2)^{-1/2} (2a) = \frac{a}{\sqrt{a^2 + b^2}}$$

$$\frac{\partial c}{\partial b} = \frac{1}{2} (a^2 + b^2)^{-1/2} (2b) = \frac{b}{\sqrt{a^2 + b^2}}$$

$$\text{also } \partial a = \frac{+3}{200}, \quad \partial b = \frac{+3}{200}$$

$$\partial c = \frac{a}{\sqrt{a^2 + b^2}} \left[\frac{+3a}{200} \right] + \frac{b}{\sqrt{a^2 + b^2}} \left[\frac{+3b}{200} \right]$$

$$\partial c = \frac{+3}{200} \left[\frac{a^2}{\sqrt{a^2 + b^2}} + \frac{b^2}{\sqrt{a^2 + b^2}} \right]$$

$$\partial c = \frac{+3}{200} (a^2 + b^2)^{-1/2}$$

$$\partial c = \frac{+3}{200} (\sqrt{a^2 + b^2})$$

$$\partial c = \frac{+3}{200} \text{ of } c$$

$$\partial c = 1.5\% \text{ of } c$$