

Q Find the envelope of $\frac{x}{a} + \frac{y}{b} = 1$
 and $a^2 + b^2 = c^2$

Step 1: diff (1) partially w.r. to $-a$

$$-\frac{x}{a^2} - \frac{y}{b^2} \frac{db}{da} = 0 \quad \text{--- (3)}$$

Step 2: $a^2 + b^2 = c^2$

$$2a + 2b \frac{db}{da} = 0$$

$$a + b \frac{db}{da} = 0$$

$$\frac{db}{da} = -\frac{a}{b} \quad \text{--- (4)}$$

$$-\frac{x}{a^2} - \frac{y}{b^2} \times -\frac{a}{b} = 0$$

$$\frac{x}{a^3} = \frac{y}{b^3}$$

$$\frac{x}{a^3} = \frac{y}{b^3} = \frac{\left(\frac{x}{a}\right) + \left(\frac{y}{b}\right)}{a^2 + b^2}$$

$$\frac{\frac{x}{a}}{a^2} = \frac{1}{c^2}$$

$$x = \frac{a^3}{c^2}$$

$$y = \frac{b^3}{c^2}$$

$$(c^2 x)^{2/3} + (c^2 y)^{2/3} = c^2$$

$$c^{4/3} (x^{2/3} + y^{2/3}) = c^2$$

$$x^{2/3} + y^{2/3} = c^{2/3}$$