~~Viscosity~~

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Ans 5) a) $$\frac{dx}{dt} = -x + ay + x^2y = 0 \quad - (i)$$

$$\frac{dy}{dt} = b - ay - x^2y = 0 \quad - (ii)$$

Adding (i) & (ii) we get

$$b - x = 0$$

$$\Rightarrow \boxed{x = b} \quad - (iii)$$

Using (iii) in (i) we get

$$-b + ay + b^2y = 0$$

$$y(a + b^2) = b$$

$$\Rightarrow \boxed{y = \frac{b}{a + b^2}} \quad - (iv)$$ Hence proved.

b) Now $y(a + b^2) = b$ (using (iv))

But $x = b$

$\therefore \boxed{y(a + x^2) = x}$

Similarly $\boxed{y = \frac{b}{a + b^2} = \frac{b}{a + x^2}}$ $(\because b = x)$

Proved.