L-Function

Define

$$L(X, Y, t)$$

is the the level of love of X for Y where

$$X, Y \in \{x | x \text{ is a person}\}; \quad t \in \mathbb{R}_+; \quad L(X, Y, t) \in \mathbb{R}_+.$$

And we can find another good example for explaning this function:

Example (of a (fake) partial differential equation): *Assume A and B are a boy and a girl. If A's love for B is two times the velocity of the increases or the decreases(at this time the velocity is negative) of B's love for A, and B's love for A is $1/2$ times the velocity of the increases or decreases(such as above) of A's love for B. And we also know that*

$$L(A, B, 0) = 0, \quad \left.\frac{\partial L(A, B, 0)}{\partial t}\right|_{t=0} = 1.$$

If

$$L(A, B, t) \geq 520 \quad \textit{and} \quad L(B, A, t) \geq 520,$$

then they will get married.

Find the value of t when they get married at the first time.

the answer is

$$t = \operatorname{arcsinh} 1040.$$