1 Time dilation of 2

You may use any programming language you wish to solve this problem!

Write a program to solve for the speed (in units of the speed of light) for which time dilation is a factor of two. That is to say, solve for v/c such that

$$\sqrt{1 - \frac{v^2}{c^2}} = \frac{1}{2} \tag{1}$$

Your program should give an answer that is accurate within $\pm 10^{-5}$. You may use multiplication, division, addition and subtraction, but you *may not* take a square root directly, nor may you use logarithms, exponentials or other transcendental functions.