Euler's Method and the S-I-R Model of Disease

Suppose we're given: S' = -.00001SI I' = .00001SI - I/14R' = I/14

with initial values at time t = 0 (in units of days): S(0) = 45400, I(0) = 2100, R(0) = 2500.

(a) Find S'(0), I'(0), and R'(0).

(b) Estimate S(1), I(1), R(1). (First write down algebraic expressions for these quantities in terms of S(0), S'(0), I(0), I'(0), R(0), R'(0) and Δt and then plug in the numbers)

(c) Using Euler's Method with $\Delta t = 1$, repeat parts (a) and (b) above to find the number of infected people on the fourth day (t = 4).

Let's confirm our calculations of how S, I and R change with time over the space of 4 days by approximating the solution of the model by using Euler's Method with $\Delta t = 1$ day

t	S	Ι	R	Δt	S'(t)	I'(t)	R'(t)	ΔS	ΔI	ΔR