

STUDENT VERSION

MICROORGANISM GROWTH AND IMMIGRATION

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STATEMENT

Consider a situation in which we are studying an organism (say a microorganism in a Petri dish) with 50 microorganisms initially in the Petri dish. We lose 50% of the population each hour due to “forces of death,” but through a one way hatch some 10 microorganisms per hour can enter our Petri dish in the first hour, 20 microorganisms per hour can enter our Petri dish in the second hour, 30 microorganisms per hour can enter our Petri dish in the third hour, 40 in the fourth hour, etc. Model this situation with (a) a discrete difference equation model and (b) a continuous differential equation model. State all your assumptions used in the model building process. Build your model very carefully and be sure to define your variables and units. Compare your models and comment on differences and similarities.

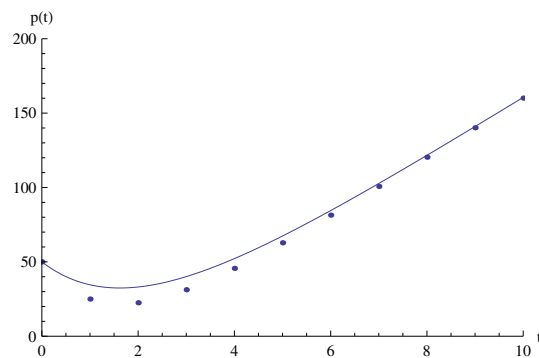


Figure 1. Plot of results of discrete and continuous modeling approach for our microorganism immigration population.

Figure 1 offers a plot of the two solutions (continuous and discrete) you should be getting. Now for an easy question. Which is which?