

MA 16020 LESSON 17: GEOMETRIC SERIES AND CONVERGENCE (PROBLEM SET)

Example 1: How much should you invest today at an annual interest rate of 5% compounded continuously so that, starting next year, you can make annual withdrawals of \$2,000 in perpetuity?

Example 2: A patient is given an injection of 25 units of a drug every 24 hours. The drug is eliminated exponentially so that the fraction that remains after t days is given by

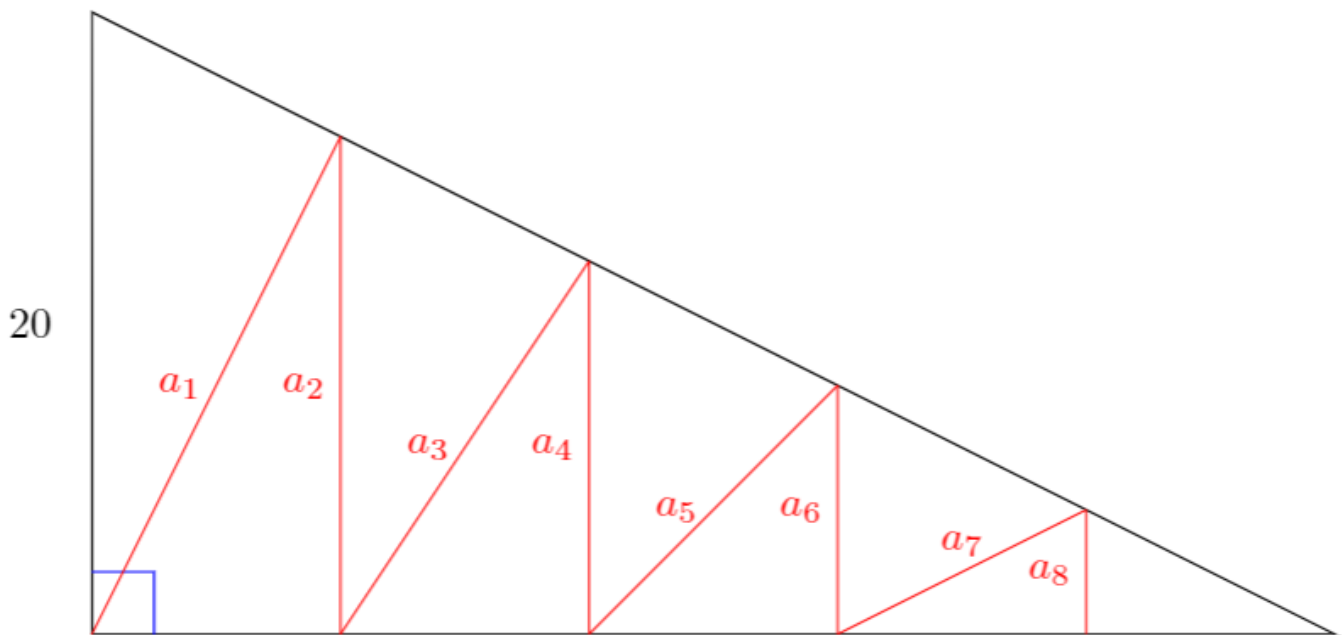
$$f(t) = e^{-t/3}$$

If the treatment is continued indefinitely, approximately how many units will eventually be in the bloodstream just prior to an injection?

Example 3: A series of line segments are drawn inside a right triangle as follows:

1. An altitude is drawn from the right angle of the triangle.
2. In the new smaller right triangle formed that contains the smallest angle of the original triangle, another altitude is drawn from the right angle of that triangle.
3. The process continues indefinitely, always moving toward the smallest angle of the original triangle.

Find the sum of the length of all these line segments if the original triangle has an angle of 55 degrees and the side adjacent to 55 degrees angle has length 20.



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