Scholarly Publications, Inc., a small academic publisher, receives subscription revenue from subscribers and operates with a small staff of fixed size. In planning for the next year, the finance department projects that expenses will be fixed, at 3.0 million dollars per month which they view as small payments paid out in a continuous stream. Their revenue, also coming from many subscribers, is viewed as being received in a continuous stream, but on an uneven basis throughout the year. Most subscribers prefer to pay in the last half of the calendar year, after they have received their funding for the academic year. The corporation’s revenue and expense stream projections for next year (in millions of dollars per month) are shown in the graph below in which the horizontal axis represents time (in months) from January 1 of the year through December 31.

(a) How much revenue does Scholarly Publications receive in a small time interval from time $t$ to time $t + \Delta t$? What is the total cash flow of the company over this time interval? Give your answers in terms of the functions and data of the problem.

(b) What is the projected total revenue of Scholarly Publications for the year? What is its average revenue per month?

(c) Suppose that on January 1, Scholarly Publications has a bank balance of 10.0 million dollars. According to their projections, will they have enough money in the bank to maintain a positive bank balance throughout the year?

(d) What will be the average bank balance over the entire year?