

Calculus I, Section 5.1, #20
Areas and Distances

The table shows the number of people per day who died from SARS in Singapore at two-week intervals beginning on March 1, 2003.¹

Date	Deaths per day	Date	Deaths per day
March 1	0.0079	April 26	0.5620
March 15	0.0638	May 10	0.4630
March 29	0.1944	May 24	0.2897
April 12	0.4435		

- (a) Estimate the number of people who died of SARS in Singapore between March 1 and May 24, 2003, using both left endpoints and right endpoints.

Note that each subinterval contains 14 days, so our $\Delta t = 14$.

The first entry in the table gives “March 1, 0.0079”. This tells us that March 1 is the left endpoint, with the value 0.0079. So

$$\begin{aligned}\text{left estimate} &= 0.0079 \cdot 14 + 0.0638 \cdot 14 + \cdots + 0.5620 \cdot 14 + 0.4630 \cdot 14 \\ &= (0.0079 + 0.0638 + 0.1944 + 0.4435 + 0.5620 + 0.4630) \cdot 14 \\ &= 24.2844\end{aligned}$$

Thus, using the left endpoints gives an estimate of ≈ 24 deaths.

The last entry in the table gives “May 24, 0.2897”. This tells us that May 24 is the right endpoint, with the value 0.2897. So

$$\begin{aligned}\text{right estimate} &= 0.0638 \cdot 14 + 0.1944 \cdot 14 + \cdots + 0.4630 \cdot 14 + 0.2897 \cdot 14 \\ &= (0.0638 + 0.1944 + 0.4435 + 0.5620 + 0.4630 + 0.2897) \cdot 14 \\ &= 28.22596\end{aligned}$$

Thus, using the right endpoints gives an estimate of ≈ 28 deaths.

- (b) How would you interpret the number of SARS deaths as an area under a curve?

The data in the table give the death *rate* as a function of the number days since March 1, 2003. The area under this rate function will give us the deaths from SARS in Singapore from March 1, 2003 until May 24, 2003.

¹Stewart, *Calculus, Early Transcendentals*, p. 377, #20.