[5.4] Interpretations of the Definite Integral

Temperature Example. Suppose $f(t)$ is the outdoor temperature in °C at t hours after midnight. The table provides known values of f.

t	0	8	10	12	18	24
$f(t)$	3	5	7	10	2	-6

1. Estimate $f'(10)$ and provide an interpretation.

2. Estimate $f''(10)$ and provide an interpretation.

3. Estimate the average temperature during the 24-hour day.

4. Estimate the area between the graph of $y=f(t)$ and the t-axis.

Heart Example. Suppose r(t) is the rate at which the heart is pumping blood in liters per second and t is the time in seconds. What does $\int_0^{10} r(t)\,dt$ mean?

Feet Example. If the units for $f(x)$ are feet per minute and the units of x are feet, then what are the units of $\int_0^5 f(x)\,dx$.

Population Example. Suppose $f(t)$ is the rate of change of the population of a city, in people per year, at time t years since the start of 1990. If the population of the city is 5000 people at the start of 1990, give an expression for the population today.

Flu Example. In Figure 5.11, the function f (t) gives the rate at which healthy people become sick with the flu, and g(t) is the rate at which they recover. Which of the graphs (a) – (d) could represent the number of people sick with the flu during a 30-day period? (What does the vertical intercept mean?)

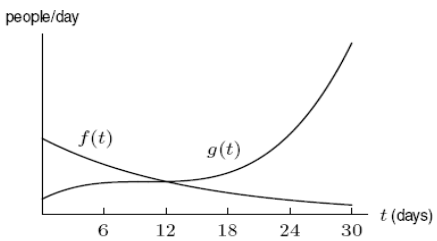

Figure 5.11