

## Companion Notes for MATH 229 Sections 10.2 and 10.3

1. The birthrate of an endangered species of whales in year  $t$  is  $f(t)$  whales/year. This species of whales is dying at the rate of  $g(t)$  whales/year in year  $t$ . What does the function  $F(t) = f(t) - g(t)$  represent?

2. An efficiency study showed that the average worker at Delphi Electronics assembled cordless telephones at the rate of

$$f(t) = -\frac{3}{2}t^2 + 6t + 10$$

phones per hour,  $t$  hours after starting work. At what rate does the average worker assemble telephones 2 hours after starting work?

3. The ratio of working-age population to the elderly in the United States (including projections after 2000) is given by

$$f(t) = \begin{cases} 4.1 & \text{if } 0 \leq t < 5 \\ -0.03t + 4.25 & \text{if } 5 \leq t < 15 \\ -0.075t + 4.925 & \text{if } 15 \leq t \leq 35 \end{cases}$$

with  $t = 0$  corresponding to the beginning of 1995.

(a) Sketch the graph of  $f$ .

(b) What will be the ratio at the beginning of 2005? At the beginning of 2020?

(c) Over what years is the ratio constant?

(d) Over what years is the decline of the ratio the greatest?