

**1.** For each of the following functions, explain in words what the derivative is telling us.

(a) The temperature in degrees Fahrenheit is given by  $F(C) = \frac{9}{5}C + 32$ , where  $C$  is the temperature in degrees Celsius.

(b) The number  $D(p)$  of donuts that I sell is a function of their price  $p$ .

(c) The time  $R(T)$  that it takes to cook a 20 lb. turkey is a function of the oven temperature  $T$ .

**2.** Let  $p$  be the price (in dollars) of 1 lb. of delicious cheese. Let  $Q(p)$  be the number of pounds of delicious cheese that I'll buy if the price is  $\$p$ .

(a) In words, what does the equation  $Q(2) = 10$  mean?

(b) Do you expect  $Q'(2)$  to be positive or negative? Why?

(c) If  $Q(2) = 10$  and  $Q'(2) = -3$ , roughly how much delicious cheese would I buy if the price  $p$  went up to  $\$2.10$ ?

(d) In words, what is  $Q'(2)$  telling you?

**3.** Newton's law of gravitation states that the gravitational force  $F$  between two bodies of mass  $m_1$  and  $m_2$  respectively is given by the equation

$$F(r) = G \frac{m_1 m_2}{r^2},$$

where  $r$  is the distance between the centers of mass of the bodies and  $G$  is the gravitational constant. Compute  $\frac{dF}{dr}$ , and explain the physical significance of its sign.