

Calculus I, Section 2.7, #56
Derivatives and Rates of Change

The quantity (in pounds) of a gourmet ground coffee that is sold by a coffee company at a price of p dollars per pound is $Q = f(p)$.¹

- (a) What is the meaning of the derivative $f'(8)$? What are its units?

The derivative $f'(8)$ gives the rate of change of the quantity (in pounds) of coffee sold as we increase the price (in dollars).

The units of the derivative are always $\frac{\text{output units from original function}}{\text{input units from original function}}$. For the original function, the output is pounds of coffee sold, and the input is the price in dollars per pound.

Thus the units for $f'(8)$ are $\frac{\text{pounds}}{\text{dollars/pound}}$.

- (b) Is $f'(8)$ positive or negative? Explain.

We interpret the rate given by the derivative as the input *increases*, so the price per pound is increasing. From the law of supply and demand, as the price increases, the quantity sold decreases. Thus we expect $f'(8)$ to be negative.

¹Stewart, *Calculus, Early Transcendentals*, p. 151, #56.