

1. Use the definition to find the derivative of the following  $f(x) = 1 - x/2$

Key

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{1 - \frac{(x+h)}{2} - \left(1 - \frac{x}{2}\right)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{x - (x+h)}{2h} = \lim_{h \rightarrow 0} \frac{-h}{2h} = -\frac{1}{2}$$

2. Find derivative of

$$f(x) = \frac{1}{x\sqrt{x}}$$

$$f(x) = x^{-\frac{3}{2}} \quad f'(x) = -\frac{3}{2} x^{-\frac{5}{2}}$$

$$= -\frac{3}{2\sqrt{x^5}}$$

3. If  $c(q)$  is the cost function of producing  $q$  unit of a product, then the average cost per  $\bar{c}$  unit is  $\bar{c} = \frac{c}{q}$  then  $c = q\bar{c}$ . If a manufacturer's average-cost equation is

$$\bar{c} = 0.0001q^2 - 0.02q$$

find the marginal-cost function. What is the marginal cost when 50 units are produced?

$$c = \bar{c}q \quad \frac{dc}{dq} = 0.0003q^2 - 0.02q$$

$$\left. \frac{dc}{dq} \right|_{q=50} = 0.0003(50)^2 - 0.02(50)$$

$$= 0.75 - 1.00 = -0.25$$