

3. The equation of motion of a particle is $s = t^3 - 10t^2 + 24t$, for $t \geq 0$, where s is measured in metres and t is measured in seconds.

(a) Find the velocity of the particle at time t .

(b) What is the velocity of the particle after 3 seconds?

(c) When is the particle at rest?

(d) When is the particle moving in the positive direction?

(e) Find the total distance travelled by the particle during the first 8 seconds?

(f) Find the acceleration of the particle after 3 seconds.

5. Use the product rule (and maybe the chain rule) to find the derivatives of the following functions.

(a) $y = x \sin(x)$

(g) $y = (3 - 4x^2) x^{-1/2}$

(b) $g = te^t$

(h) $y = (1 + \sin(\theta))(1 - \sin(\theta))$

(c) $h(y) = e^y \cos(y)$

(i) $g(z) = \sqrt{z} \ln(z)$

(d) $s(t) = 3t \ln(t)$

(j) $h(x) = (x^2 + 3x)(e^x - 1)(\sqrt{x} - \sqrt[3]{x})$

(e) $f(x) = \sin(x) \ln(x)$

(f) $u(z) = e^z(z^2 + 1)$

(k) $f(\theta) = \csc(\theta) \tan(\theta) \cot(\theta) \sin(\theta)$

6. Use the quotient rule to find the derivatives of the following functions.

(a) $y = \frac{x+1}{x-1}$

(f) $u(z) = \frac{\ln(z)}{z}$

(b) $g = \frac{\sin(t)}{t}$

(g) $y = \frac{x}{\cos(x)}$

(c) $h(y) = \frac{\sin(y)}{e^y}$

(h) $y = \frac{\theta + \sin(\theta)}{\cos(\theta)}$

(d) $s(t) = \frac{t^2+1}{t+1}$

(i) $g(z) = \frac{z^2}{1-\sqrt{z}}$

(e) $f(x) = \frac{\cos(x)}{\sqrt{x}}$

(j) $f(x) = \frac{x^2-3x+1}{\sqrt{x}}$