## **≡** Item Navigation

## The Material Acceleration

Consider the vector differential equation

$$rac{dm{r}}{dt}=m{u}(t,m{r}(t)),$$

where

$$oldsymbol{r} = x_1oldsymbol{i} + x_2oldsymbol{j} + x_3oldsymbol{k}, \qquad oldsymbol{u} = u_1oldsymbol{i} + u_2oldsymbol{j} + u_3oldsymbol{k}.$$

- (a) Write down the differential equations for  $dx_1/dt$  ,  $dx_2/dt$  and  $dx_3/dt$ ;
- (b) Use the chain rule to determine formulas for  $d^2x_1/dt^2$  ,  $d^2x_2/dt^2$  and  $d^2x_3/dt^2$ ;
- (c) Write your solution for  $d^2{m r}/dt^2$  as a vector equation using the  ${m 
  abla}$  differential operator.

## ✓ Completed

## Go to next item

riangle Like riangle Dislike riangle Report an issue