

**Vector Functions and Curves**  
*One variable functions*

**Question**

Show that if the scalar product of the velocity and acceleration of an object in motion is negative (or positive) then the speed of the object is decreasing (or increasing).

**Answer**

$$\frac{d}{dt}|\underline{v}|^2 = \frac{d}{dt}\underline{v} \bullet \underline{v} = 2\underline{v} \bullet \underline{a}$$

Speed  $v = |\underline{v}|$

If  $\underline{v} \bullet \underline{a} > 0$  then the speed is increasing.

If  $\underline{v} \bullet \underline{a} < 0$  then the speed is decreasing.