At $t = 0$, a sports car starting at rest at $x = 0$ accelerates with an x-component of acceleration given by

$$a_x(t) = At - Bt^3, \text{ for } 0 < t < (A/B)^{1/2}$$

and zero afterwards with $A, B > 0$.

1) Find expressions for the velocity and position vectors of the sports car as a function of time for $t > 0$.

2) Sketch graphs of the x-component of the position, velocity and acceleration as a function of time for $t > 0$. 