**8C Calculus in Mechanics**

1. A particle is moving in a straight line with acceleration at time t seconds given by:

$a=cos2πt ms^{-2}$, $   t\geq 0$

The velocity of the particle at time $t=0$ is $\frac{1}{2π} ms^{-1}$. Find:

1. An expression for the velocity at time $t$ seconds
2. The maximum speed of the particle
3. The distance travelled in the first 3 seconds
4. A particle of mass 6kg is moving on the positive x-axis. At time $t$ seconds the displacement, $s$, of the particle from the origin is given by:

$s=\left(2t^{\frac{3}{2}}+\frac{e^{-2t}}{3}\right)m$, where $t\geq 0$

1. Find the velocity of the particle when $t=1.5$
2. Given that the particle is acted on by a single force of variable magnitude $F N$ which acts in the direction of the positive x-axis, find the value of $F$ when $t=2$