Answer each of the following questions.

1. A particle moving on a line will be s feet from a fixed point P after t seconds where $s = f(t) = t^3 - 4t^2$, $t \geq 0$. (Note that if s < 0, then the particle is to the left of point P, and if s > 0, then the particle is to the right of point P.)

    a. Express the velocity, v, and the acceleration, a, as a function of t.

        v = _____   a = _____

    b. Fill out the table below giving the position relative to point P, the velocity, and the acceleration of the particle at the indicated times.

t	s	v	a
0			
1			
2			
3			
4			
5			

2. A particle moving on a straight line starts from rest at point P. Its acceleration, a, after t seconds is given by the equation $a = 12 - 6t$ (ft/s^2) where $t \geq 0$.

    a. Express the velocity, v, of the particle as a function of t.   v = _____

    b. Express the distance, s, that the particle is from point P as a function of t.

                                      s = _____

    c. When will the particle again be at rest? How far from point P is it then?

    d. When will the particle again be at point P? How fast will it be moving then?

Answer each of the following questions.

3. The velocity at time t of a particle moving on a straight line is $v = t^2 - 2$ (fps) where $t \geq 0$.

    a. Express the acceleration, a, of the particle as a function of t.   a = _____

    b. Find the acceleration of the particle when t = 6 s.

    c. If s is the distance that the particle is from its starting point, then express s as a function of t.

                                                              s = _____

    d. How far does the particle move from t = 3s to t = 4s?

4. A bullet fired straight up from ground level reaches a height of 3456 feet in 3 seconds. Assume the acceleration due to gravity is a constant 32 feet per second per second when you answer the following questions.

    a. Let v be the velocity of the bullet and let s be the distance the bullet is above the ground. Express both as a function of t, where t is the time in seconds since the gun was fired. (For the sake of simplicity, neglect air resistance.)

        v = _____   s = _____

    b. What is the maximum height that the bullet will reach?

    c. When will be bullet hit the ground?