

## MCS22 Homework 18

1. A particle is moving along a horizontal line with position function  $s(t) = t^3 - 12t^2 + 36t - 24$  for  $t \geq 0$ .
  - (a) When is the particle moving to the left? to the right?
  - (b) When does the particle change its direction?
  - (c) When is the particle speeding up? slowing down?
  - (d) What is the total distance travelled by the particle from  $t = 1$  to  $t = 7$ ?
  
2. A particle is moving along a horizontal line with position function  $s(t) = -t^3 + 9t^2 - 24t + 1$  for  $t \geq 0$ .
  - (a) When is the particle moving to the left? to the right?
  - (b) When does the particle change its direction?
  - (c) When is the particle speeding up? slowing down?
  - (d) What is the total distance travelled by the particle from  $t = 0$  to  $t = 5$ ?
  
3. A particle is moving along a horizontal line with position function  $s(t) = 2 + 6t - t^2$  for  $t \geq 0$ .
  - (a) When is the particle at rest?
  - (b) When is the speed of the particle constant?
  - (c) What is the total distance travelled by the particle from  $t = 0$  to  $t = 5$ ?
  
4. If the position function of a particle is  $x(t) = t + \frac{9}{t+1} + 1$ , find the total distance and the total displacement from  $t = 0$  to  $t = 8$ .