

## Position, Velocity, & Acceleration

Name \_\_\_\_\_

Given the equation for the position of a particle at time  $t$ , indicate

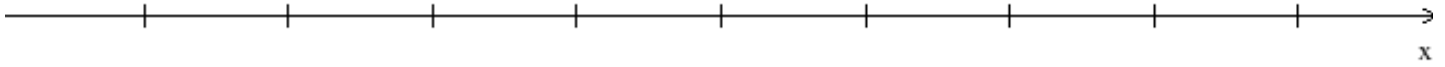
- a) when the particle is moving to the left
- b) when and where the particle changes directions
- c) its maximum and minimum velocities

1)  $x(t) = t^2 - 9t - 14 \quad t \geq 0$

2)  $x(t) = t^3 - 9t^2 + 15t + 4 \quad t \geq 0$

3)  $x(t) = 3t^4 - 22t^3 + 30t^2 + 48t + 1 \quad t \geq 0$

- 4) Caitriona and Samantha are sitting on the  $x$ -axis arguing over who is the better student. Sam begins chasing Caitriona back and forth on the  $x$ -axis. Melody and Riley sit with a bowl of popcorn watching and observing the chase over a period of 8 seconds. They determine the equation for Caitriona's position on the  $x$ -axis to be  $x(t) = t^4 - 15t^3 + 75t^2 - 125t - 2$   $0 \leq t \leq 8$



- a) Where on the  $x$ -axis were they originally sitting?
- b) During what times are they running to the right?
- c) Does Caitriona ever stop and then start again without changing directions? If so, when and where?
- d) What are her maximum and minimum velocities?
- e) On the number line above, draw the path of her run over 8 seconds indicating all points where she stops.