

AP CALCULUS**Particle Motion, Day 2**

- 1) Suppose $x(t) = 2t^3 - 15t^2 + 24t - 5$ is a position of a particle moving along the x-axis on the interval $[0,10]$. $x(t)$ is measured in meters and t is measure in seconds.
- Find the average velocity of the particle on the interval of $[0,3]$.
 - Find the average acceleration of the particle on the interval of $[0,3]$.
 - Find the velocity at $t = 3$.
 - Find the acceleration at $t = 3$.
 - Is the particle speeding up or slowing down at $t = 3$. Justify your answer.
 - When is the particle moving to the left? Justify your answer.
 - When is the particle moving to the right? Justify your answer.
 - When is the velocity of the particle increasing? Justify your answer.
 - When is the velocity of the particle decreasing? Justify your answer.
 - When is the particle speeding up? Justify your answer.
 - When is the particle slowing down? Justify your answer

2) A particle is moving along the x-axis on the interval $[0,10]$. The graph represents the velocity, in meters per second, of the particle.

a. Find the average acceleration on the interval $[0,7]$.

b. Find the velocity at $t = 1$.

c. When is the particle moving to the left?

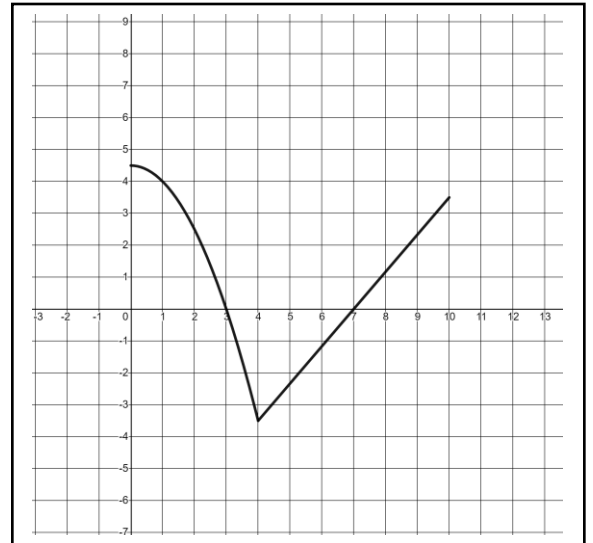
d. When is the particle moving to the right?

e. When is the acceleration of the particle positive?

f. When is the acceleration of the particle negative?

g. When is the particle speeding up?

h. When is the particle slowing down?



- 3) Given below is the position, velocity, and acceleration of a particle moving along the x-axis. All functions are differentiable and continuous. $x(t)$ is measured in meters and t is measured in seconds.

| | | | | | |
|--------|----|----|----|----|----|
| t | 0 | 2 | 4 | 6 | 8 |
| $x(t)$ | 1 | 4 | -3 | 6 | 12 |
| $v(t)$ | 4 | -1 | -2 | -1 | 10 |
| $a(t)$ | -3 | 4 | 5 | 0 | -2 |

- Find the average velocity at between $t = 0$ and $t = 8$.
- Find the average acceleration at between $t = 0$ and $t = 8$.
- Estimate $a(5)$.
- Estimate $v(5)$.
- At $t = 4$ is the particle moving left or right? Justify your answer.
- At $t = 4$ is the velocity decreasing or increasing? Justify your answer.
- At $t = 4$ is the particle speeding up or slowing down? Justify your answer.
- Does the particle change directions at least once between $t = 0$ and $t = 4$? Explain your answer.