

15 June 2007

Quiz 7: Math 135, Section C7

Let $s(t) = t^3 - 9t^2 + 15t + 25$ represent the position of an object moving along a line, where $0 \leq t \leq 10$.

1. Find the velocity $v(t)$.
2. Find the acceleration $a(t)$.
3. When is the object advancing? When is the object retreating?

$$\triangleq$$
$$M$$

4. What is the total distance traveled by the object?
 5. What is the net change in distance of the object from $t = 0$ to $t = 10$?
 6. When is the object accelerating? When is it decelerating?
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1. $v(t) = s'(t) = 3t^2 - 18t + 15 = 3(t^2 - 6t + 5) = 3(t - 5)(t - 1)$.

2. $a(t) = v'(t) = 6t - 18$.

3. The object is advancing when $v(t) > 0$. This happens when $t < 1$ and $t > 5$. The object is retreating when $v(t) < 0$. This happens when $1 < t < 5$.

4. The object is advancing from $t = 0$ to $t = 1$, then it is retreating from $t = 1$ to $t = 5$, then it is advancing again from $t = 5$ to $t = 10$. Therefore the total distance traveled is

$$|s(1) - s(0)| + |s(5) - s(1)| + |s(10) - s(5)| = 314$$

5. The net change is

$$s(10) - s(0) = 250$$

6. The object is accelerating when $a(t) > 0$. This happens when $t > 3$. The object is decelerating when $a(t) < 0$. This happens when $t < 3$.