IB Math SL Notes **Evaluation of the Integration Constant**

Topic 6, Part II – Day 3

1. **Finding c:**

A value for c can be found as long as you are given some additional information. We actually did this on day 1… The additional information is called a “boundary condition.”

**Ex:** If f’(x) = 3x2 + 10x – 3 and f(2) = 11, find f(x).

**Ex 2:** Given that and that y = 1 when , find y as a function of x.

1. **Kinematics**

Recall: s(t) = position

 v(t) = velocity = s’(t)

 a(t) = acceleration = v’(t)

Likewise, we can say:



 

**Ex 3:** A particle is projected in a straight line relative to a fixed point, O, with velocity function  If the displacement of the particle from O at time t = 2 is 8, find

1. The displacement function, s(t).
2. The displacement of the particle when t = 4.

**Ex 4:** A particle moves along a straight line so that its velocity, v ms-1 at time t seconds is given by

 v(t) = e2sin t – 1, where 

1. Find the acceleration of the particle at t = 1.
2. i) Using your GDC, sketch a graph of v(t).

ii) Using your GDC, determine the value(s) of t where the particle has a velocity of 5 m s-1.

iii) At time t = 0 the particle is at the origin. Use the graph of v(t) to explain whether or not the particle returns to the origin.

1. **Finding Total distance travelled***: (which is not the same as displacement)*
* Draw a sign chart for v(t) so we know when direction changes
* Find s(t) through integration.
* Find s(t) for the endpoints of motion and for any value of t when direction changes.
* Calculate the distance travelled in each interval (distance = abs. value).
* Add to get total distance.

**Ex 5:** A particle is projected in a straight line relative to a fixed point, O, with velocity function . Displacement is in cm and time is in seconds. What is the total distance travelled in 4 seconds?

**Ex 6:** A particle is projected in a straight line relative to a fixed point, O, with velocity function . Displacement is in meters and time is in seconds. What is the total distance travelled in 6 seconds?