

Tuesday December 2 2015

Definite Integral as an accumulator

Velocity of an object moving in a straight line is given by $v(t) = 4t^3 + \cos(0.2t)$ meters.How far will the object travel from $t = 3$ minutes to $t = 8$ minutes?

$$\int_3^8 (4t^3 + \cos(0.2t)) dt = \left[t^4 + 5 \sin(0.2t) \right]_3^8 = 4017.1746556482 = \boxed{4017.175 \text{ meters}}$$

Find the average velocity over the time interval

$$\frac{1}{5} \int_3^8 (4t^3 + \cos(0.2t)) dt = \boxed{803.435 \text{ meters per minute}}$$

1. Let f and g be differentiable functions with the values for f , g , f' , and g' at $x=1$ and $x=2$ given in the table below:

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	$\sqrt{7}$	12	-8
2	2	π	-9	10

a. Find the derivative of $f \cdot g$ at $x = 2$

b. Find the derivative of $\frac{f}{g}$ at $x = 1$

c. Find the derivative of $g(f(x))$ at $x = 2$

2. A particle is moving in a due east direction from a point P in such a way that the following table gives its velocity in feet per second at specific points in time in seconds. Position, $s(8) = 21$ feet.

t	5	7	8	9	10	11	12
$v(t)$	35	50	60	75	80	86	90

a. Find the acceleration at $t = 9$ seconds.

b. Find the position at $t = 11$ seconds. Use Trapezoids in your computation.

c. Find the average velocity for $5 \leq t \leq 12$