

### Practice Questions

1. What functions  $y(t)$  have the constant derivative  $s(t) = 7$ ?
2. What is the area from 0 to  $t$  under the graph of  $s(t) = 7$ ?
3. From  $t = 0$  to 2, find the integral  $\int_0^2 7 dt = \underline{\hspace{2cm}}$ .
4. What function  $y(t)$  has the derivative  $s(t) = 7 + 6t$ ?
5. From  $t = 0$  to 2, find area = integral  $\int_0^2 (7 + 6t) dt$ .
6. At this instant  $t = 2$ , what is  $\frac{d(\text{area})}{dt}$ ?

7. From 0 to  $t$ , the area under the curve  $s = e^t$  IS NOT  $y = e^t$ .  
If  $t$  is small, the area must be small. But  $t = 0$  has  $y = e^0 = 1$ .
8. From 0 to  $t$ , the correct area under  $s = e^t$  is  $y = e^t - 1$ .  
The slope  $\frac{dy}{dt}$  is  $\underline{\hspace{2cm}}$  and now  $y(0) = \underline{\hspace{2cm}}$
9. Notice  $y_0$  in  $(y_1 - y_0) + (y_2 - y_1) + (y_3 - y_2) = \underline{\hspace{2cm}}$ .  
The sum of  $\Delta y = \frac{\Delta y}{\Delta t} \Delta t$  becomes the integral of  $\frac{dy}{dt} dt$   
The area under  $s(t)$  from 0 to  $t$  becomes  $y(t) - y(0)$ .

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Resource: Highlights of Calculus  
Gilbert Strang

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