Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Section 4.1 – Finding Distance travelled from the velocity function

1. Given the following position fns, *s*, find the associated velocity functions, *v:*
	1. t = hours since 12:00, s(t) = mile marker, $s\left(t\right)= c+30t$
	2. t = hours since 12:00, s(t) = mile marker, $s\left(t\right)= c-10t$
	3. t = sec, s(t) = height in ft, $s\left(t\right)=c+t^{2}$
	4. t = sec, s(t) = height in ft, $s\left(t\right)=c+t^{3}$
2. If the velocity function is given by $v\left(t\right)= 30\frac{miles}{hr}$ where *t = hours since 12:00* and *v(t)* is the velocity at time *t:*

|  |  |
| --- | --- |
| A: Find the general form for the position function *s(t)* and verify that *s’(t) = v(t).*B: Use the position function to find the distance travelled from *t=2* to *t=6*. | C: Draw the graph of *v(t)*  from *t=2* to *t=6 on a t-v axis*. D: Use the graph in part C to find the distance travelled from *t=2* to *t=6*. |

E: What is the difference between the results of the two approaches?

1. If the velocity function is given by $v\left(t\right)= -10\frac{miles}{hr}$ where *t = hours since 12:00* and *v(t)* is the velocity at time *t:*

|  |  |
| --- | --- |
| A: Find the general form for the position function *s(t)* and verify that *s’(t) = v(t).*B: Use the position function to find the distance travelled from *t=3* to *t=5*. | C: Draw the graph of *v(t)* from *t=3* to *t=5 on a t-v axis*. D: Use the graph in part C to find the distance travelled from *t=3* to *t=5*. |

E: What is the difference between the results of the two approaches?

1. If the velocity function is given by $v\left(t\right)= 2t\frac{ft}{sec}$ where *t = seconds that have gone by* and *v(t)* is the velocity at time *t:*

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| --- | --- |
| A: Find the general form for the position function *s(t)* and verify that *s’(t) = v(t).*B: Use the position function to find the distance travelled from *t=0* to *t=3*. | C: Draw the graph of *v(t)*  from *t=0* to *t=3 on a t-v axis*. D: Use the graph in part C to find the distance travelled from *t=0* to *t=3*. |

E: What is the difference between the results of the two approaches?

1. If the velocity function is given by $v\left(t\right)=3t^{2}\frac{ft}{sec}$ where *t = seconds that have gone by* and *v(t)* is the velocity at time *t (only one approach below will work):*

|  |  |
| --- | --- |
| A: Find the general form for the position function *s(t)* and verify that *s’(t) = v(t).*B: Use the position function to find the precise distance travelled from *t=0* to *t=2*. | C: Draw the graph of *v(t)*  from *t=0* to *t=2 on a t-v axis*. D: Can you use the graph in part C to find the precise distance travelled from *t=0* to *t=2*. Why or why not? |

E: Why does only one approach work to find the precise distance?

1. If the velocity function is given by the table below where *t = hours that have gone by* and *v(t)* is the velocity at time *t* in miles per hour *(only one approach below will work):*

|  |  |  |  |
| --- | --- | --- | --- |
| *t* | 2 | 4 | 6 |
| *v(t)* | 1 | 5 | 3 |

|  |  |
| --- | --- |
| A: Can you find the general form for the position function *s(t)* so that *s’(t) = v(t)? Why or why not?*B: Can you use the position function to find the distance travelled from *t=2* to *t=6? Why or why not?* | C: Plot the known points *(t,v(t))*  from *t=2* to *t=6 on a t-v axis*. D: Use the graph in part C and whatever geometric approach makes sense to you, approximate the distance travelled from *t=2* to *t=6*. |

E: Why does only one approach allow us to find an approximation?