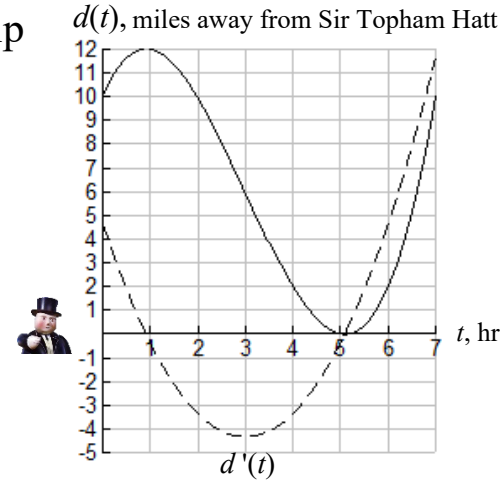
Thomas Takes a Trip

t	$d(t)$
0	10
1	12
2	10
3	6
4	2
5	0
6	2
7	10



Name_____

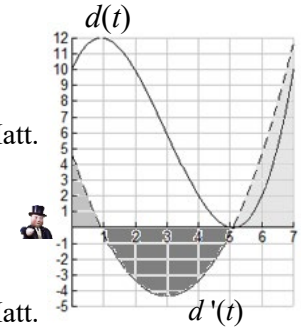
Circle one: 9:00 10:00 Table: ___ Group: ____

Thomas the Tank Engine is $d = f(t)$ miles from his boss Sir Topham Hatt, where t is given in hours. The graph of $d = f(t)$ is shown for $0 \le t \le 7$.

The derivative, $d'(t)$ is Thomas' instantaneous velocity $v(t)$ at time t. Recall $d'(t)$ also gives Thomas' trajectory of movement. See his trip at users.pfw.edu/lamaster/ma165/ThomasTrip.htm

Turn this completed sheet in at the beginning of class on Tuesday, August 22 for one Rhino bonus participation point.

1. Consider the net signed area under the dashed velocity curve $d'(t)$. Report to the nearest integer.



a. Report $\int_0^1 d'(t)dt =$ _____ miles.

Interpret: On the interval $0 < t < 1$, Thomas' displacement is ____ miles _____ Topham Hatt.
{away from, toward}
Over this interval Thomas is _____.
{speeding up, slowing down }

b. Report $\int_1^3 d'(t)dt =$ _____ miles.

Interpret: On the interval $1 < t < 3$, Thomas' displacement is ____ miles _____ Topham Hatt.
{away from, toward}
Over this interval Thomas is _____.
{speeding up, slowing down }

c. Report $\int_3^5 d'(t)dt =$ _____ miles.

Interpret: On the interval $3 < t < 5$, Thomas' displacement is ____ miles _____ Topham Hatt.
{away from, toward}
Over this interval Thomas is _____.
{speeding up, slowing down }

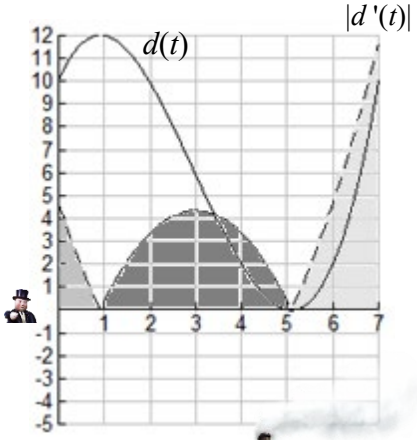
d. Report $\int_5^7 d'(t)dt =$ _____ miles

Interpret: On the interval $5 < t < 7$, Thomas' displacement is ____ miles _____ Topham Hatt.
{away from, toward}
Over this interval Thomas is _____.
{speeding up, slowing down }

e. Report $\int_0^7 d'(t)dt =$ _____ miles

Interpret: On the interval $0 < t < 7$, _____

2. Consider the area under the dashed speed curve $|d'(t)|$. Report to the nearest integer.



a. Report $\int_0^1 |d'(t)|\,dt =$ _____ miles

b. Report $\int_1^3 |d'(t)|\,dt =$ _____ miles

c. Report $\int_3^5 |d'(t)|\,dt =$ _____ miles

d. Report $\int_5^7 |d'(t)|\,dt =$ _____ miles

e. Report $\int_0^7 |d'(t)|\,dt =$ _____ miles

3. On the interval for $0 \le t \le 7$, consider each.
Assume at $t = 0$, his "trip odometer," which records miles traveled, is set to 0 miles.

a. He is the maximum distance of _____ miles from Topham Hatt at what time(s)? $t =$ _____

b. Report the total number of miles the odometer reads at the end of the trip, i.e., after 7 hours. _____ miles

c. Thomas speeds up when _____ is concave _____ and when _____ is _____.
{ d, d', $|d'|$ } {up, down } { d, d', $|d'|$ } {increasing, decreasing}

d. Thomas slows down when _____ is concave _____ and when _____ is _____.
{ d, d', $|d'|$ } {up, down } { d, d', $|d'|$ } {increasing, decreasing}