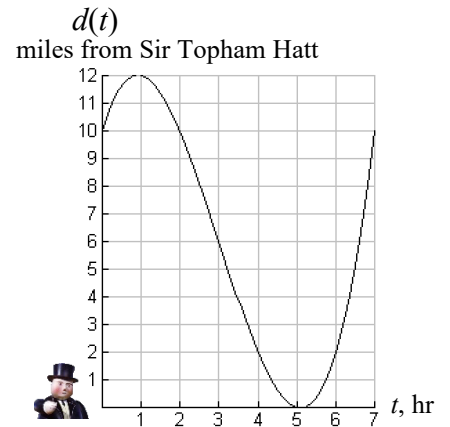


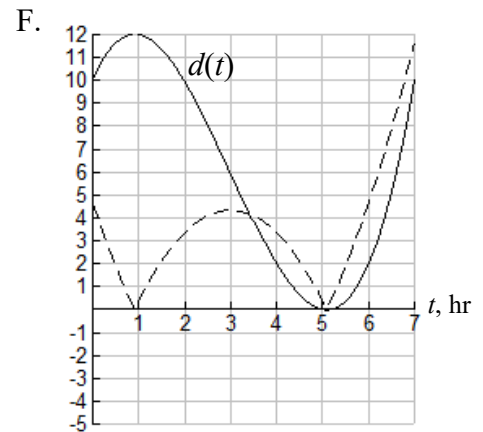
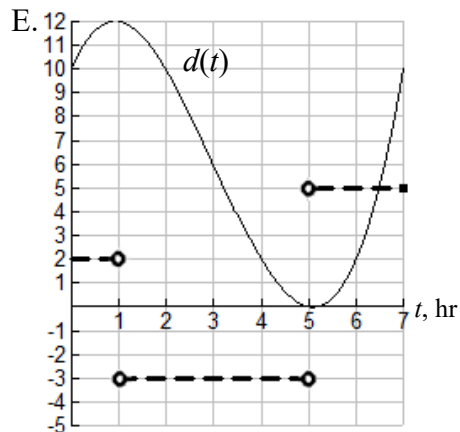
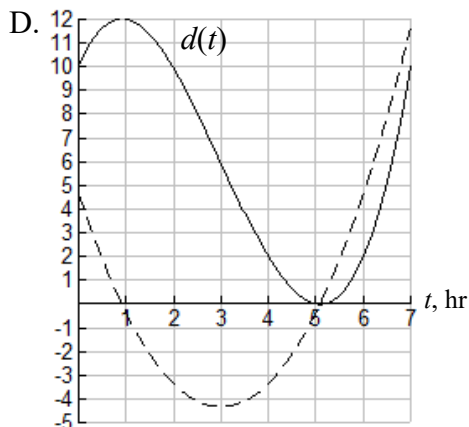
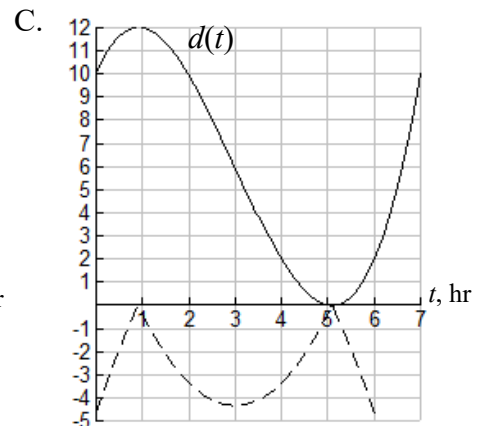
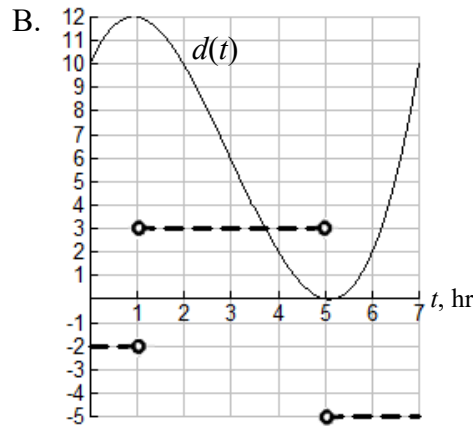
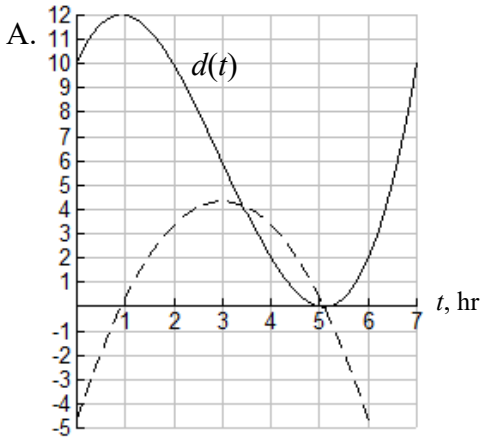
The Velocity of Thomas the Tank Engine

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 $0 \leq t \leq 7$. The derivative, $d'(t)$ is Thomas' instantaneous velocity $v(t)$ at time t . Recall $d'(t)$ also gives Thomas' trajectory of movement.



1. Near what integer values of t is Thomas' velocity $v(t) = d'(t) = 0$?
Hint: look at when the tangent line is horizontal. $t =$ _____
2. a. On what intervals of t is $v(t) = d'(t) > 0$? _____
b. At these times, is Thomas traveling *toward* Sir Topham Hatt or *away*? _____
3. a. On what intervals of t is $v(t) = d'(t) < 0$? _____
b. At these times, is Thomas traveling *toward* Sir Topham Hatt or *away*? _____
4. Discuss any values of t for which there are any absolute extremum (max or min) of $v(t) = d'(t)$ on $0 \leq t \leq 7$.

5. Which of the following (dashed) graphs below is the velocity $v(t) = d'(t)$ of Thomas? Select one. Explain your reasoning.



6. Interpret what the dashed graph in Choice F represents in the context of Thomas' trip.