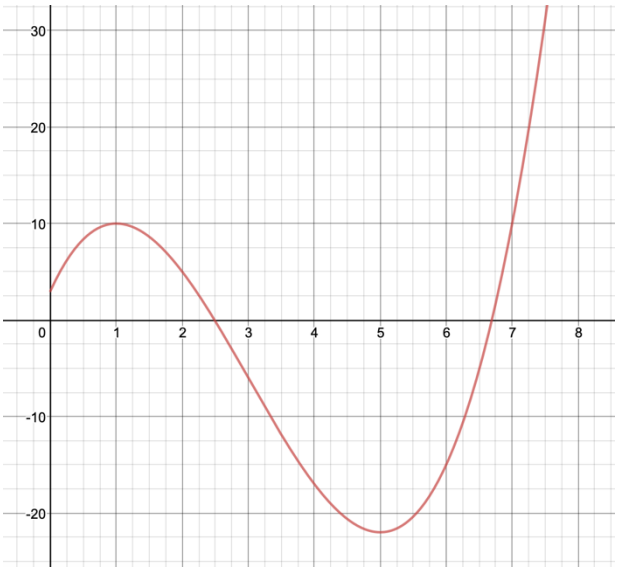
Crack the Code
Calc-Medic
Section 4.1 – 4.3

1. The position of a particle, in meters, traveling on a straight line is given by $x(t)$ for $0 \leq t \leq 8$, where t is in seconds. The graph of $x(t)$ is shown below.



A. The particle is furthest to the left when $t = 5$.

B. The particle is moving away from the origin at $t = 6$.

C. The particle is furthest to the right when $t = 1$.

D. The speed of the particle is faster at $t = 2$ than at $t = 3$.

E. The particle is moving toward the origin at $t = 2$.

F. The particle is at rest when $t = 2.5$.

G. The particle is at rest twice on the interval $[0, 8]$.

H. The particle is moving towards the right at $t = 6$.

I. The average velocity on $[1, 7]$ is 0 meters per second.

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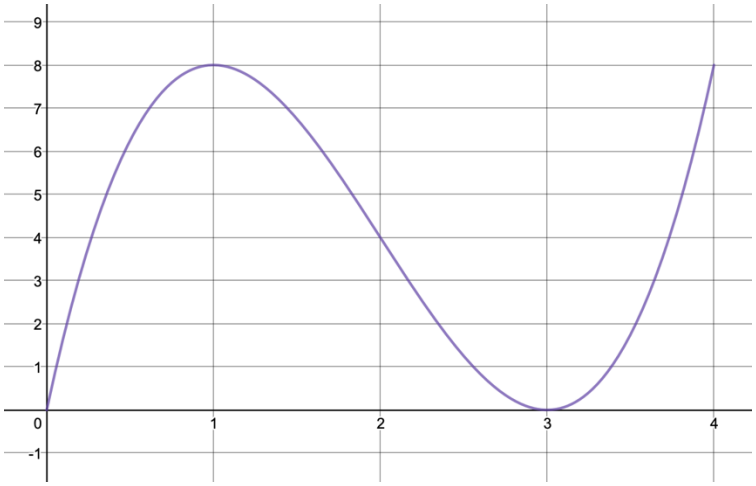
2. The velocity of an ant for $0 \leq t \leq 4$ is given by $v(t) = 2t(t-3)^2$ where $v(t)$ is in inches per minute and t is in minutes. The graph of $v(t)$ is shown below.



A. The ant is at rest at $t = 0$ and $t = 3$.

B. The ant changes direction at $t = 3$.

C. The acceleration of the ant is always positive.

D. The ant is moving the fastest at $t = 1$ and $t = 4$.

E. The ant is speeding up when $t = 2$.

F. The ant is speeding up when $t = 4$.

G. At $t = 1$, the ant is moving towards the right.

H. The average acceleration of the ant is positive over the interval $[0,4]$.

I. The acceleration of the ant is 0 at $t = 1$.

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3. The rate at which people enter an auditorium for a rock concert is modeled by the function *R* given by $R(t) = 1380t^2 - 675t^3$ for $0 \le t \le 2$ hours. $R(t)$ is measured in people per hour. No one is in the auditorium at $t = 0$ when the doors open. The doors close and the concert begins at time $t = 2$.

A. $R'(t)$ represents the *rate* at which people are entering the auditorium.

B. At $t = 1$, the rate at which people are entering the auditorium is increasing at a rate of 735 people/hour per hour.

C. At $t = 1$, the rate at which people are entering the auditorium is increasing at a rate of 735 people/hour.

D. At $t = 1$, the rate at which people are entering the auditorium is 735 people/hour per hour.

E. At $t = 1$, the rate at which people are entering the auditorium is 735 people/hour.

F. At $t = 1$, the rate at which people are entering the auditorium is 705 people/hour.

G. At $t = 1$, the rate at which people are entering the auditorium is 705 people/hour per hour.

H. At $t = 1$, the rate at which people are entering the auditorium is increasing by 705 people/hour per hour.

I. The rate that people enter the auditorium is slower at $t = 1$ than at $t = 1.75$.

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4. The rate at which rainwater flows into a drainpipe is modeled by the function *R*, where $R(t) = 20\sin\left(\frac{t^2}{35}\right)$ cubic feet per hour, *t* is measured in hours and $0 \le t \le 8$. The pipe is partially blocked, allowing water to drain out the other end of the pipe at a rate modeled by $D(t) = -.04t^3 + 0.4t^2 + 0.96t$ cubic feet per hour, for $0 \le t \le 8$. There are 30 cubic feet of water in the pipe at time $t = 0$.

A. The amount of water in the tank is increasing at $t = 3$.

B. The rate at which water is draining from the pipe at $t = 1$ is 1.64 cubic feet per hour.

C. The rate at which water is draining from the pipe at $t = 1$ is 1.32 cubic feet per hour.

D. The rate at which water is draining from the pipe at $t = 1$ is increasing at a rate of 1.64 cubic feet per hour per hour.

E. The volume of water in the pipe at $t = 4$ is decreasing at a rate of 1.148 cubic feet per hour.

F. The volume of water in the pipe is not changing for some time *t* on $[2,5]$.

G. The rate at which rainwater flows into the pipe and the rate at which the rainwater leaks from the pipe is the same at $t = 0$.

H. At $t = 2$, more water is draining from the pipe than is flowing into the pipe.

I. The rate of change of volume in the tank is given by $30 + R(t) - D(t)$

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