AP Calculus *name*_____*p*____
Position/Velocity/Acceleration Review (from Demana Waits p. 371)
Calculators are allowed

1. Given $v(t) = 6t^2 - 18t + 12,$ on $0 \le t \le 2$

   a) Determine when the particle is moving to the right, to the left, and stopped.

   b) Find the particle's displacement for the given time interval.

   c) Find the total distance traveled by the particle.

2. An automobile, at rest, accelerates at the rate of $1 + 3\sqrt{t}$.

   a) What is its velocity of the automobile at time *t*?

   b) What is the automobiles displacement at time *t*?

3. A particle travels with velocity $v(t) = (t - 2) \sin t$ m/sec for $0 \le t \le 4$ sec.

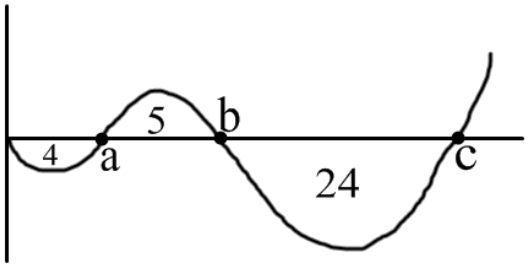
   a) What is the particle's displacement?

   b) What is the total distance traveled?

4. The rate of consumption of oil in the U.S. during the 1980s (in billions of barrels/year) is modeled by the function $C = 27.08e^{t/25}$, where *t* is the number of years after January 1, 1980. Find the total consumption of oil in the U.S. from January 1, 1980 to January 1, 1990.

5. The rate at which your home consumes electricity is measured in kilowatts. If your home consumes electricity at the rate of 1 kilowatt for 1 hour, you will be charged for 1 "kilowatt-hour" of electricity. Suppose that the average consumption rate for a certain home is modeled by the function $C(t) = 3.9 - 2.4\sin(\pi t/12)$, where $C(t)$ is measured in kilowatts and *t* is the number of hours past midnight. Find the average hourly consumption for this home, measured in kilowatt-hours.

For exercises 6-10, a particle moves along the *x*-axis (units in cm). Its initial position at *t* = 0 sec is $x(0)=15$. The figure shows the graph of the particle's velocity $v(t)$. The numbers are the *areas* of the enclosed region.



6. What is the particle's displacement between *t* = 0 and *t* = *c*?

7. What is the total distance traveled by the particle in the same time period?

8. Give the positions of the particle at times *a*, *b*, and *c*.

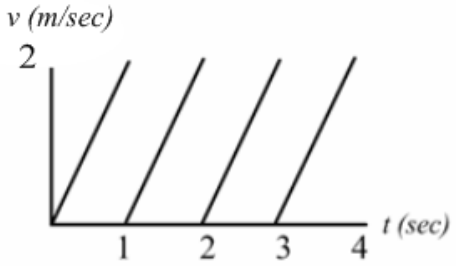
9. Where does the particle achieve its greatest positive acceleration on the interval [0, *b*]?

10. Where does the particle achieve its greatest positive acceleration on the interval [0, *c*]?

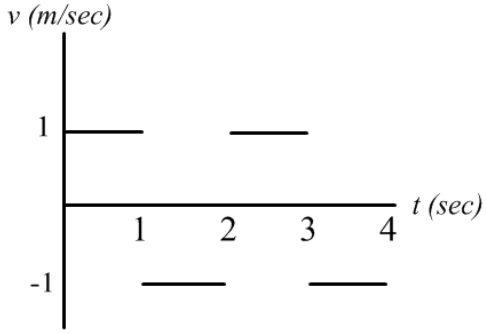
In exercises 11-13, the graph of the velocity of a particle moving on the *x*-axis is given. The particle starts at *x* = 2 when *t* = 0.

a) Find where the particle is at the end of the trip.
b) Find the total distance traveled by the particle.

11.



12.



13.