Calculators Allowed

1. D 2. C 3. A 4. D

5. $\int_1^2 f(x)dx < \int_0^2 f(x)dx < \int_0^1 f(x)dx$

6. a. 2474; over the first 30 minutes, 2474 cars pass through

   b. 15,174 cars

7. a. $t = 2.507$, $v(t)$ changes signs b. 4.334

7. a. 1730 ft. b. overestimate because $v(t)$ is increasing

No Calculators

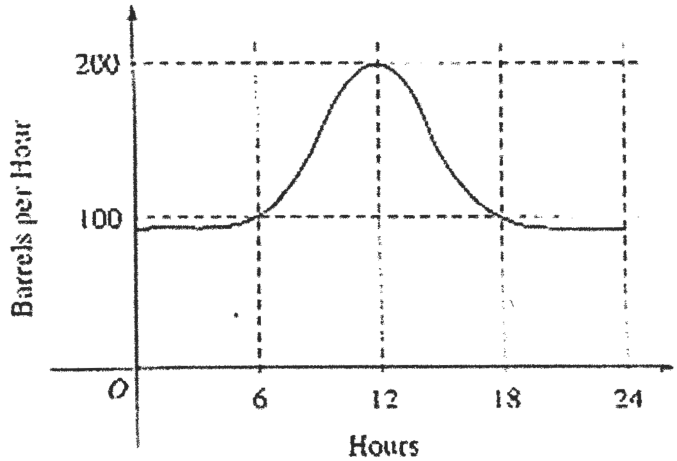
1. $\pi + 14.5$ 2. 139

3. $x = 4$ because $f(0) = 9$, $f(4) = 2$, $f(5) = 6$, and $x = 1$ is not a max or min.

Name ________________

Period ________________

Calculus AB -- Chapter 5A Sample Test (calculators allowed)



1. The rate at which oil flows through a pipeline, in barrels per hour, is given by the graph shown above. Of the following, which best approximates the total number of barrels of oil that passed through the pipeline that day?

(A) 500 (B) 600 (C) 2,400 (D) 3,000 (E) 4,800

$5\cdot(6\cdot 100) = 3000$

2. Let f be a function such that $\boxed{f(-x) = -f(x)}$ for all x. If $\int_0^2 f(x)\,dx = 5$, then $\int_{-2}^{2}(f(x)+6)\,dx =$

$\Rightarrow \int_{-2}^{0} f(x)\,dx = -5$

(A) 6 (B) 16 (C) 24 (D) 34

$\int_{-2}^{2} f(x)\,dx + \int_{-2}^{2} 6\,dx = \int_{-2}^{0} f(x)\,dx + \int_{0}^{2} f(x)\,dx + \int_{-2}^{2} 6\,dx = -5+5+6\cdot 4 = 24$

3. A pizza is taken out of an oven at a temperature of 350°F at time $t = 0$ minutes. The temperature of the pizza is changing at a rate of $R(t) = -110e^{-0.4t}$ degrees Fahrenheit per minute. To the nearest degree, what is the temperature of the pizza at time $t = 5$ minutes?

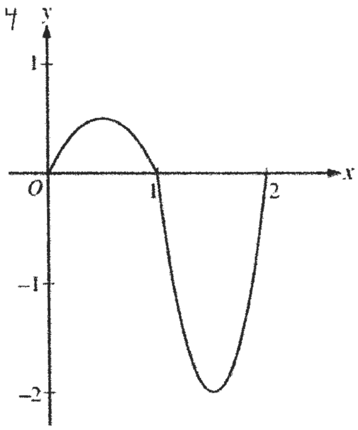
(A) 112°F (B) 119°F (C) 147°F (D) 238°F (E) 335°F

$T(5) = T(0) + \int_0^5 R(t)\,dt$

4. If $\int_4^{-10} g(x)\,dx = -3$ and $\int_4^6 g(x)\,dx = 5$, then $\int_{-10}^6 g(x)\,dx =$

(A) -8 (B) -2 (C) 2 (D) 8

$\int_{-10}^{6} g(x)\,dx = \int_{-10}^{4} g(x)\,dx + \int_{4}^{6} g(x)\,dx = 3 + 5 = 8$



5. The graph of a function $f(x)$ is shown above. Put the following in order from least to greatest: $\int_0^1 f(x)\,dx$, $\int_1^2 f(x)\,dx$, $\int_0^2 f(x)\,dx$.

$\downarrow$ pos $\quad$ $\downarrow$ neg $\quad$ $\downarrow$ pos - neg = small neg

$\int_1^2 < \int_0^2 < \int_0^1$

6. Traffic flow is defined as the rate at which cars pass through an intersection, measured in cars per minute. The traffic flow at a particular intersection is modeled by the function F defined by

$$F(t) = 82 + 4\sin\left(\frac{t}{2}\right) \text{ for } 0 \le t \le 30,$$

where $F(t)$ is measured in cars per minute and t is measured in minutes.

a. Find the value of $\int_0^{30} F(t)\,dt$. Explain the meaning of $\int_0^{30} F(t)\,dt$. Indicate units of measure.

$\int_0^{30} F(t)\,dt = 2474.078 \leftarrow$ # of cars over 1st 30 min.

b. Assume that an observer has observed 12,700 cars pass through the intersection by 10:00am on a particular morning. By 10:30am of the same day, how many cars will have passed the observer?

$12700 + \int_0^{30} R(t)\,dt = 15174$

7. A particle moves along the x-axis so that its velocity at time t is given by

$$v(t) = -(t+1)\sin\left(\frac{t^2}{2}\right).$$

At time $t = 0$, the particle is at position $x = 1$.

a. Find all times t in the open interval $0 < t < 3$ when the particle changes direction. Justify your answer.

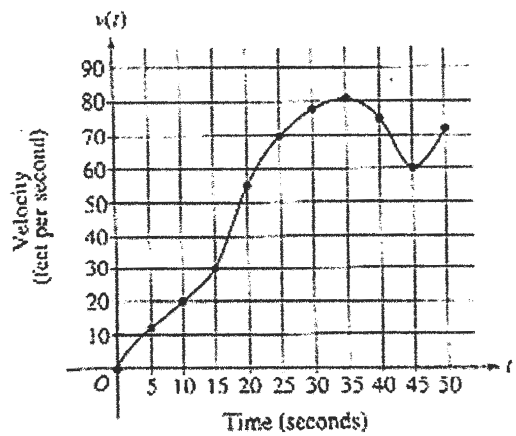
$v(t) = 0$ $\quad$ $v(t)$ changes signs

$t = 2.507$

b. Find the total distance traveled by the particle from time $t = 0$ until time $t = 3$.

$\int_0^3 |v(t)|\,dt = 4.334$

8. The graph of the velocity $v(t)$, in ft./sec., of a car traveling on a straight road is shown below. The table of values for $v(t)$, at 5 second intervals of time t, is shown to the right of the graph. At time $t = 0$, the car has just driven away from Carlsbad High School.



t (seconds)	$v(t)$ (feet per second)
0	0
5	12
10	20
15	30
20	55
25	70
30	78
35	81
40	75
45	60
50	72

a. Use a right-hand Riemann sum with 7 subintervals of equal length to approximate the distance of the car from CHS after 35 seconds.

$\int_0^{35} v(t)\,dt = 5v(5) + 5v(10) + 5v(15) + 5v(20) + 5v(25) + 5v(30) + 5v(35)$

$\doteq 1730$

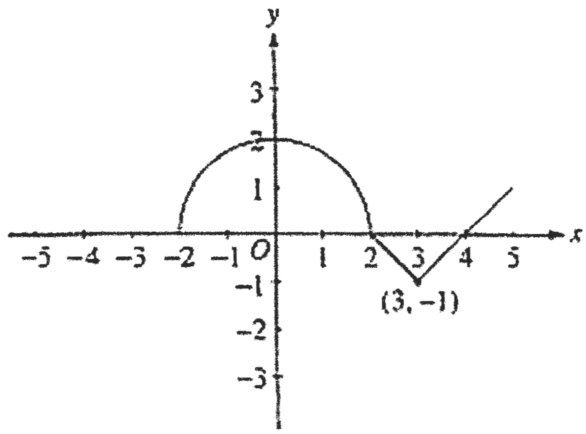
b. Is your approximation from part (a) an overestimate or an underestimate of the actual distance? Give a reason for your answer.

over, $v(t)$ is inc.

Name ________________

Period ________________

Calculus AB -- Chapter 5A Sample Test (no calculators)



1. A particle moving along the y-axis has velocity that is given in the graph above, which consists of a semicircle and two line segments. If $y(0)=15$, find $y(3)$.

$y(3) = y(0) + \int_0^3 v(t)\,dt = 15 + \frac{1}{4}\pi(2)^2 - \frac{1}{2}\cdot 1\cdot 1$

$= 15 + \pi - \frac{1}{2}$

$= 14.5 + \pi$

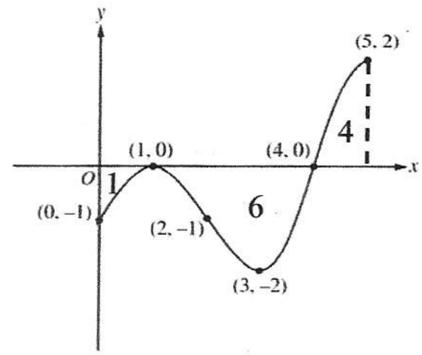
t	0	0.5	2	3
$v(t)$	20	60	40	30

2. The table above gives the velocity $v(t)$ of a particle moving along the x-axis at selected times t. If the particle has an initial position $x(0) = 9$, use a trapezoid sum with the three subintervals indicated by the table to approximate $x(3)$.

$x(3) = x(0) + \int_0^3 v(t)\,dt$

$= 9 + \frac{1}{2}(v(0) + v(.5))\cdot \frac{1}{2} + \frac{1}{2}(v(.5) + v(2))\cdot \frac{3}{2} + \frac{1}{2}(v(2) + v(3))\cdot 1$

$= 139$



Graph of f'

3. The figure above shows the graph of f', the derivative of the function f, on the closed interval $0 \le x \le 5$. The graph of f' has horizontal tangent lines at $x = 1$ and $x = 3$, and the area of each region is given. The function f is twice differentiable with $f(5) = 6$.

   At what value of x does f attain its absolute minimum value on the closed interval $0 \le x \le 5$? Show the analysis that leads to your answer.

$f(0) = 9$

~~f(1)~~ = not local max, or min,

$f(4) = 2$

$f(5) = 6$

$\int_4^5 f'(x)\,dx = f(5) - f(4)$

$4 = 6 - f(4)$

$f(4) = 2$

$\boxed{\text{Abs. min, at } x = 4}$

$\int_0^5 f'(x)\,dx = f(5) - f(0)$

$-1 - 6 + 4 = 6 - f(0)$

$f(0) = 9$