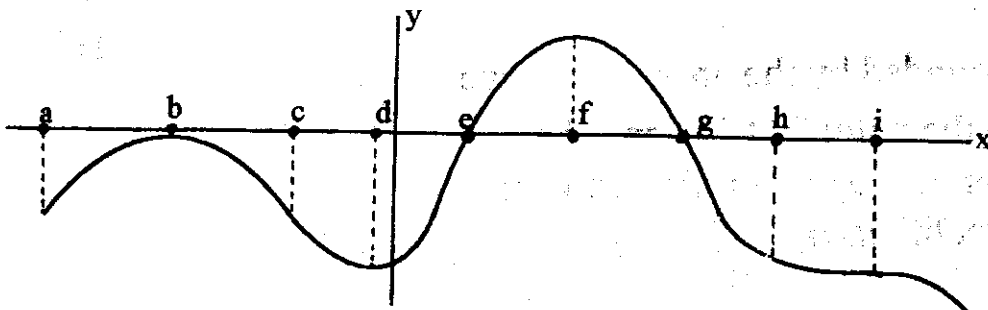
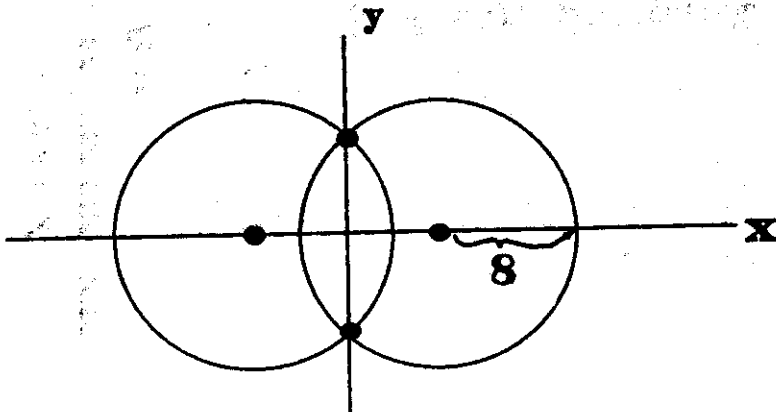


- #1 The graph shown is the derivative of $f(x)$. Give the interval(s) where the graph of f is both increasing and concave up.



- #2 A particle moves along the x -axis with velocity at time $t > 0$ given by $v(t) = \sec^2 t$, whenever the function is defined. What is the average acceleration of the particle over the interval $[\frac{\pi}{4}, \frac{\pi}{3}]$?

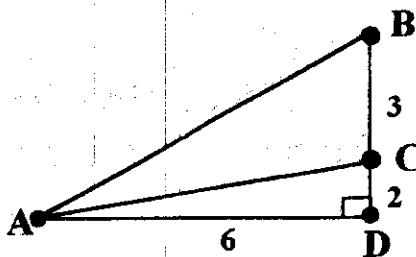
- #6 Two circles of radius 8 intersect as shown, with their centers 12 units apart. Find the area of the region in which they overlap. Round your answer to the thousandths place.



- #3 A wolf population increases at a rate directly proportional to the population at any time $t > 0$. Two years ago, the population was 200 wolves, and now it is 400 wolves. How many wolves will there be in three years from now? (Round to the nearest wolf)

- #4 If $\int x^2 e^x dx = e^x f(x) - f'(x) + f''(x) + c$ then $f(x) = \underline{\hspace{2cm}}$.
- #5 Let R be the region enclosed by the graph of $y = 3x - x^2$ and the x -axis. The area of R is equivalent to a rectangle whose width is the same as the width of R (along the x -axis). What is the perimeter of the rectangle?

#7 Point C is dropping vertically at $\frac{1}{2}$ unit per minute. Point B remains stationary. Find the absolute rate that \overline{AC} is changing, when $BC=2(CD)$. Round final answer to the nearest thousandth.



#8 Let R be the region bounded by the arc of the curve $y = x^{\frac{2}{3}}$ from the point A(1,1) to the point B(4,8), and the segment \overline{AB} . Find the perimeter of the region. Round your final answer to the nearest hundredth place.

#9 Given that $x = \cos(t)$ and $y = \sin(t)$ for $0 \leq t < 2\pi$ find an expression in terms of x and y only for $\frac{dy}{dx}$.

#10 Solve the differential equation $\frac{dy}{dx} = \frac{x+3x^2}{y^2}$ and find the solution for which $y=6$ and $x=0$.

y=?

#11 Let f and g be differentiable even polynomial functions and $f(1)=6$, $f'(5)=3$, $g'(-1)=3$ and $g(-1)=5$. Let $h(x)=f(g(x))$ and find the value of $h'(1)$.

#13 If $\int_1^x (\ln x - 3) dx = 4$ and $x > 0$ then $x = ?$

#12 $\frac{4x-1}{x(x-2)^2} = \frac{A}{x} + \frac{B}{x-2} + \frac{C}{(x-2)^2}$

Evaluate $\int_0^1 (A) dx$

#14 Let $\lim_{x \rightarrow \frac{\pi}{2}^-} (\tan x)^{\cos x} = k$. Find $|3k^2 - k + 10|$.

#15 Find an approximation of the root of $\cos x = x$ by Newton's Method. Let $r_1 = 0.5$ and use one more iteration. To the thousandth place, $r_2 =$