

Work the following on **notebook paper**.

Work problems 1-3 by both methods.

1. $y' = 2 + \frac{1}{x^2}$ and $y(1) = 6$. Find $y(3)$.

2. $f'(x) = \cos(2x)$ and $f(0) = 3$. Find $f\left(\frac{\pi}{4}\right)$.

3. Water flows into a tank at a rate of $\frac{dW}{dt} = \frac{1}{75}(600 + 20t - t^2)$, where $\frac{dW}{dt}$ is measure in gallons per hour and t is measured in hours. If there are 150 gallons of water in the tank at time $t = 0$, how many gallons of water are in the tank when $t = 24$?

Work problems 4-8 using the Fundamental Theorem of Calculus and your calculator.

4. $f'(x) = \cos(x^3)$ and $f(0) = 2$. Find $f(1)$.

5. $f'(x) = e^{-x^2}$ and $f(5) = 1$. Find $f(2)$.

6. A particle moving along the x -axis has position $x(t)$ at time t with the velocity of the particle $v(t) = 5 \sin(t^2)$. At time $t = 6$, the particle's position is $(4, 0)$. Find the position of the particle when $t = 7$.

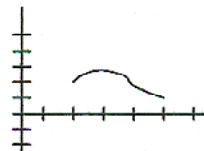
7. Let $F(t)$ represent a bacteria population which is 4 million at time $t = 0$. After t hours, the population is growing at an instantaneous rate of 2^t million bacteria per hour. Find the total increase in the bacteria population during the first three hours, and find the population at $t = 3$ hours.

8. A particle moves along a line so that at any time $t \geq 0$ its velocity is given by $v(t) = \frac{t}{1+t^2}$. At time $t = 0$, the position of the particle is $s(0) = 5$. Determine the position of the particle at $t = 3$.

Use the Fundamental Theorem of Calculus and the given graph.

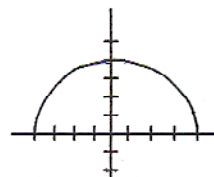
9. The graph of f' is shown on the right.

$$\int_1^4 f'(x) dx = 6.2 \text{ and } f(1) = 3. \text{ Find } f(4).$$



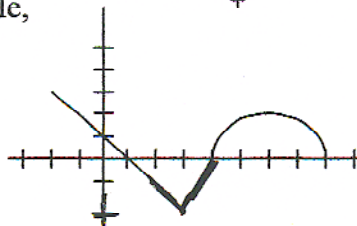
10. The graph of f' is the semicircle shown on the right.

Find $f(-4)$ given that $f(4) = -7$.



11. The graph of f' , consisting of two line segments and a semicircle, is shown on the right. Given that $f(-2) = 5$, find:

- a) $f(1)$ b) $f(4)$ c) $f(8)$



12. Let f be the function whose graph goes through the point $(3, 6)$ and whose derivative is given by

$$f'(x) = \frac{1+e^x}{x^2}. \text{ Find } f(3.1).$$

13. (Multiple Choice) If f is the antiderivative of $\frac{x^2}{1+x^5}$ such that $f(1) = 5$, then $f(4) =$

[A] 4.988

[B] 5

[C] 5.016

[D] 5.376

[E] 5.629