

Using Integrals to Find Areas

1) Consider the integral $\int_{-1}^6 (x^2 - 9) dx$.

a) Evaluate the integral.

b) Does the answer from part (a) represent the total area between the graph of $y = x^2 - 9$ and the x -axis? Explain.

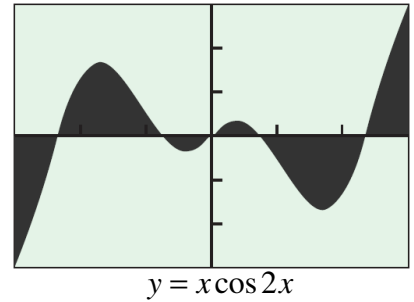
c) Determine the total area between the graph of $y = x^2 - 9$ and the x -axis?

How to Find Total Area Analytically

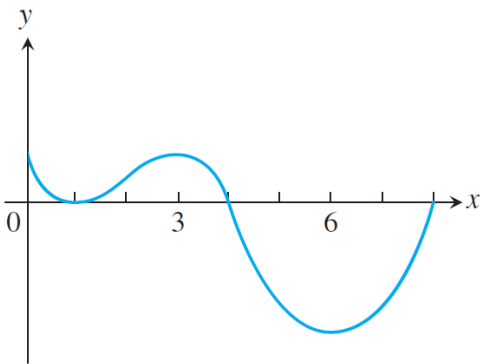
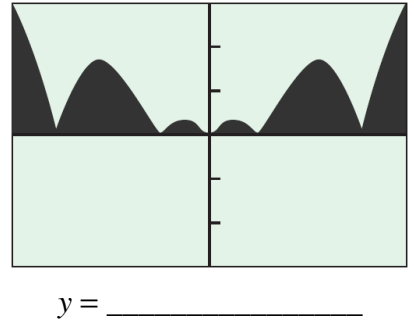
To find the area between the graph of $y = f(x)$ and the x -axis over the interval $[a, b]$ analytically,

1. partition $[a, b]$ with the zeros of f ,
2. integrate f over each subinterval,
3. add the absolute values of the integrals.

- 2) a) Use your calculator to determine the **net area** between the graph of $y = x \cos 2x$ and the x -axis over the interval $-3 \leq x \leq 3$.



- b) Use your calculator to determine the **total area** between the graph of $y = x \cos 2x$ and the x -axis over the interval $-3 \leq x \leq 3$. The graphs shown on the right may be helpful.



- 3) The graph of a continuous function f with domain $[0, 8]$ is shown on the left. Let h be the function defined by $h(x) = \int_1^x f(t) dt$.

- a) Find $h(1)$.
- b) Is $h(0)$ positive or negative? Explain.
- c) Find the value of x for which $h(x)$ is a maximum.
- d) Find the value of x for which $h(x)$ is a minimum.
- e) Find the x -coordinates of all points of inflection for the graph of $y = h(x)$.