

Exact Area Under a Curve

Numberbender | WORKSHEET



Name: _____ Date: _____ Score: _____

Graph and find the exact area for each problem. Show all work.

Calculus Worksheet #41

Examples:

<p>1) $f(x) = 2x + 1$; $a = 0$, $b = 2$</p> $\int_0^2 (2x + 1) dx = x^2 + x \Big _0^2 = (4 + 2) - 0 = \boxed{6}$	
<p>2) $f(x) = x^2 - 4$; $a = 2$, $b = 4$</p> $\int_2^4 (x^2 - 4) dx = \left[\frac{x^3}{3} - 4x \right]_2^4 = \left(\frac{64}{3} - 16 \right) - \left(\frac{8}{3} - 8 \right) = \boxed{\frac{32}{3}}$	

In Exercises 1 – 8 Graph and find the area under the graph of f from a to b

1. $f(x) = x + 1$; $a = 0$, $b = 3$	2. $f(x) = 4 - x$; $a = -1$, $b = 2$
3. $f(x) = 4 - x^2$; $a = -2$, $b = 2$	4. $f(x) = 4x - x^2$; $a = 0$, $b = 4$
5. $f(x) = \cos x$; $a = -\frac{\pi}{2}$, $b = \frac{\pi}{2}$	6. $f(x) = \sin x$; $a = \frac{\pi}{6}$, $b = \frac{\pi}{3}$
7. $f(x) = e^{2x}$; $a = 0$, $b = 1$	8. $f(x) = e^x$; $a = -1$, $b = 1$

In Exercises 9 – 13 Graph and find the area of the region described.

9. Bounded by the x -axis and the parabola $y = 4 - x^2$	
10. Bounded by the x -axis and the parabola $y = 4x - x^2$	
11. Bounded by the curve $y = \sqrt{x}$ and the lines $x = 4$ and $y = 0$	
12. Lying in the first quadrant and bounded by the curves $y = \sin x$, $y = 1$, and $x = 0$	
13. Bounded by the parabola $y = x^2$ and the line $y = x + 2$	
14. $\int_1^1 x dx =$	15. $\int_0^0 (x+2) dx =$

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Answer key — for instructor use only.

Answers:

1. $\frac{15}{2}$	2. $\frac{21}{2}$	3. $\frac{32}{3}$	4. $\frac{32}{3}$	5. 2	6. $\frac{\sqrt{3}-1}{2}$	7. $\frac{e^2-1}{2}$	8. $\frac{e^2-1}{e}$
9. $\frac{32}{3}$	10. $\frac{32}{3}$	11. $\frac{16}{3}$	12. $\frac{\pi}{2}-1$	13. $\frac{9}{2}$	14. $\frac{-3}{2}$	15. 0	