

Problems #1 – 4: Find the area under the graph of $f(x)$ from a to b . Graphing Calculator NOT permitted.

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. $f(x) = 4x - x^2; a = 0, b = 4$

Problems #5 – 8: Find the area under the graph of $f(x)$ from a to b . Graphing Calculator is permitted.

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. $f(x) = e^x; a = -1, b = 1$

For #9 – 10: Graph and find the area of the region bounded by $f(x)$ and the x -axis.

In these two problems, you need to “find” a (left most x -value) and b (right most x -value).

They are where $f(x)$ crosses the x -axis.

9. Bounded by the x -axis and the parabola $y = 4 - x^2$ (What is $a?$ $b?$)
10. Bounded by the x -axis and the parabola $y = 4x - x^2$ (What is $a?$ $b?$)

Graph the region stated and then find the area of the bounded region.

11. Bounded by the curve $y = \sqrt{x}$ and the lines $x = 4$ and $y = 0$ (What is $a?$ $b?$)
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Express the limit as a definite integral. You do not need to evaluate the integral.

12. $\lim_{n \rightarrow \infty} \sum_{k=1}^n x_k^2 \Delta x, [0, 2]$	13. $\lim_{n \rightarrow \infty} \sum_{k=1}^n (x_k^2 - 3x_k) \Delta x, [-7, 5]$	14. $\lim_{n \rightarrow \infty} \sum_{k=1}^n \frac{1}{x_k} \Delta x, [1, 4]$
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Use areas to evaluate each integral. Draw a sketch and shade in the appropriate regions.

15. Evaluate the integral: $\int_{-2}^1 5 dx$	16. Evaluate the integral: $\int_3^7 (-20) dx$	17. Evaluate the integral: $\int_0^4 3\theta d\theta$
18. $\int_{-2}^4 \left(\frac{1}{2}x + 3\right) dx$	19. $\int_{1/2}^{3/2} (-2x + 4) dx$	20. $\int_{-3}^3 \sqrt{9 - x^2} dx$

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. $a = 2; b = -2$ $\frac{32}{3}$	10. $a = 0; b = 4$ $\frac{32}{3}$	11. $a = 0; b = 4$ $\frac{16}{3}$	