Calculus Practice: Average Value of a Function 2b

For each problem, find the average value of the function over the given interval.

1) $f(x) = -\frac{3}{x}$; [–4, –2]

2) $f(x) = \frac{1}{x}$; [2, 3]

3) $f(x) = \frac{5}{x}$; [2, 5]

4) $f(x) = \frac{5}{x - 3}$; [4, 5]

5) $f(x) = -2e^x$; [–2, 1]

6) $f(x) = -3e^x$; [–3, 0]

7) $f(x) = -e^x$; [–1, 1]

8) $f(x) = -3e^{2x+4}$; [–5, –2]

9) $f(x) = \csc x \cot x;\ [\frac{\pi}{2}, \frac{3\pi}{4}]$

10) $f(x) = 2\sec x \tan x;\ [-\frac{\pi}{6}, \frac{\pi}{6}]$

11) $f(x) = -\csc^2 x;\ [\frac{\pi}{2}, \frac{3\pi}{4}]$

12) $f(x) = 2\cos x;\ [-\frac{\pi}{4}, \frac{\pi}{4}]$

13) $f(x) = \frac{1}{x\sqrt{x^2 - 4}};\ [\frac{4\sqrt{3}}{3}, 4]$

14) $f(x) = \frac{1}{1 + x^2};\ [\frac{\sqrt{3}}{3}, \sqrt{3}]$

15) $f(x) = \frac{1}{\sqrt{1 - x^2}};\ [\frac{1}{2}, \frac{\sqrt{2}}{2}]$

16) $f(x) = \frac{1}{\sqrt{9 - x^2}};\ [\frac{3}{2}, \frac{3\sqrt{2}}{2}]$

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For each problem, find the average value of the function over the given interval.

1) $f(x) = -\frac{3}{x}$; $[-4, -2]$

$\frac{-3\ln 2 + 3\ln 4}{2} \approx 1.04$

2) $f(x) = \frac{1}{x}$; $[2, 3]$

$\ln 3 - \ln 2 \approx 0.405$

3) $f(x) = \frac{5}{x}$; $[2, 5]$

$\frac{5\ln 5 - 5\ln 2}{3} \approx 1.527$

4) $f(x) = \frac{5}{x-3}$; $[4, 5]$

$5\ln 2 \approx 3.466$

5) $f(x) = -2e^x$; $[-2, 1]$

$\frac{-2e^3 + 2}{3e^2} \approx -1.722$

6) $f(x) = -3e^x$; $[-3, 0]$

$\frac{-e^3 + 1}{e^3} \approx -0.95$

7) $f(x) = -e^x$; $[-1, 1]$

$\frac{-e^2 + 1}{2e} \approx -1.175$

8) $f(x) = -3e^{2x+4}$; $[-5, -2]$

$\frac{-e^6 + 1}{2e^6} \approx -0.499$

9) $f(x) = \csc x \cot x;\ [\frac{\pi}{2}, \frac{3\pi}{4}]$

$\frac{-4\sqrt{2}+4}{\pi} \approx -0.527$

10) $f(x) = 2\sec x \tan x;\ [-\frac{\pi}{6}, \frac{\pi}{6}]$

0

11) $f(x) = -\csc^2 x;\ [\frac{\pi}{2}, \frac{3\pi}{4}]$

$-\frac{4}{\pi} \approx -1.273$

12) $f(x) = 2\cos x;\ [-\frac{\pi}{4}, \frac{\pi}{4}]$

$\frac{4\sqrt{2}}{\pi} \approx 1.801$

13) $f(x) = \frac{1}{x\sqrt{x^2-4}};\ [\frac{4\sqrt{3}}{3}, 4]$

$\frac{3\pi+\pi\sqrt{3}}{96} \approx 0.155$

14) $f(x) = \frac{1}{1+x^2};\ [\frac{\sqrt{3}}{3}, \sqrt{3}]$

$\frac{\pi\sqrt{3}}{12} \approx 0.453$

15) $f(x) = \frac{1}{\sqrt{1-x^2}};\ [\frac{1}{2}, \frac{\sqrt{2}}{2}]$

$\frac{\pi\sqrt{2}+\pi}{6} \approx 1.264$

16) $f(x) = \frac{1}{\sqrt{9-x^2}};\ [\frac{3}{2}, \frac{3\sqrt{2}}{2}]$

$\frac{\pi\sqrt{2}+\pi}{18} \approx 0.421$