

Lösungen zu den Übungen zum Mittelwert einer Funktion

Berechnen Sie den Mittelwert der Funktion $f(x)$ im Integral $[a; b]$!

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| $f(x) = 4x^2 + 4$ $I = [3; 6]$ | $\bar{m} = \frac{\int_3^6 f(x) dx}{6-3} = \frac{\left[\frac{4}{3}x^3 + 4x\right]_3^6}{3} = \frac{264}{3} = 88$ |
| $f(x) = 2x^3 + 4x - 6$ $I = [-5; 10]$ | $\bar{m} = \frac{\int_{-5}^{10} f(x) dx}{10-(-5)} = \frac{\left[0,5x^4 + 2x^2 - 6x\right]_{-5}^{10}}{15} = \frac{4747,5}{15} = 316,5$ |
| $f(x) = -4x^2 - 6$ $I = [3; 6]$ | $\bar{m} = \frac{\int_3^6 f(x) dx}{6-3} = \frac{\left[-\frac{4}{3}x^3 - 6x\right]_3^6}{3} = \frac{-270}{3} = -90$ |
| $f(x) = 3 \cdot e^{-4x}$ $I = [2; 7]$ | $\bar{m} = \frac{\int_2^7 f(x) dx}{7-2} = \frac{\left[-\frac{3}{4}e^{-4x}\right]_2^7}{5} \approx \frac{0,000252}{5} \approx 0,00005$ |
| $f(x) = 3x^3 + x$ $I = [-3; 3]$ | $\bar{m} = \frac{\int_{-3}^3 f(x) dx}{3-(-3)} = \frac{\left[\frac{3}{4}x^4 + x^2\right]_{-3}^3}{6} = \frac{0}{6} = 0$ |
| $f(x) = 4x^4 + 1$ $I = [-3; -1]$ | $\bar{m} = \frac{\int_{-3}^{-1} f(x) dx}{-1-(-3)} = \frac{\left[\frac{4}{5}x^5 + x\right]_{-3}^{-1}}{2} = \frac{195,6}{2} = 97,8$ |
| $f(x) = 3\sqrt{2x} + 6$ $I = [1; 9]$ | $\bar{m} = \frac{\int_1^9 f(x) dx}{9-1} = \frac{\left[2 \cdot \sqrt{2} \cdot x^{\frac{3}{2}} + 6x\right]_1^9}{8} = \frac{121,539}{8} \approx 15,19$ |
| $f(x) = \frac{1}{x}$ $I = [2; 6]$ | $\bar{m} = \frac{\int_2^6 f(x) dx}{6-2} = \frac{\left[\ln x\right]_2^6}{4} \approx \frac{1,098}{4} \approx 0,27$ |