Calculus Practice: Average Value of a Function 1b

For each problem, find the average value of the function over the given interval. Then, find the values of *c* that satisfy the Mean Value Theorem for Integrals.

1) $f(x) = -x + 2;\ [0, 5]$

2) $f(x) = 2x - 2;\ [-1, 3]$

3) $f(x) = -\frac{x^2}{2} + x - \frac{5}{2};\ [-1, 0]$

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

5) $f(x) = 3x^{\frac{1}{2}};\ [0, 3]$

6) $f(x) = 3x^{\frac{1}{2}};\ [0, 2]$

7) $f(x) = (x-2)^{\frac{1}{2}}$; [2, 5]

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

9) $f(x) = \frac{1}{x^2}$; [–4, –2]

10) $f(x) = \frac{5}{x^2}$; [–3, –1]

11) $f(x) = -\frac{4}{(x+3)^2}$; [–6, –5]

12) $f(x) = -\frac{5}{(x+1)^2}$; [–5, –2]

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For each problem, find the average value of the function over the given interval. Then, find the values of *c* that satisfy the Mean Value Theorem for Integrals.

1) $f(x) = -x + 2;\ [0, 5]$

Average value of function: $-\frac{1}{2} = -0.5$

Values that satisfy MVT: $\frac{5}{2} = 2.5$

2) $f(x) = 2x - 2;\ [-1, 3]$

Average value of function: 0

Values that satisfy MVT: 1

3) $f(x) = -\frac{x^2}{2} + x - \frac{5}{2};\ [-1, 0]$

Average value of function: $-\frac{19}{6} \approx -3.167$

Values that satisfy MVT: $\frac{3 - \sqrt{21}}{3} \approx -0.528$

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

Average value of function: $-\frac{5}{6} \approx -0.833$

Values that satisfy MVT: $\frac{3 - \sqrt{21}}{3} \approx -0.528, \frac{3 + \sqrt{21}}{3}$

5) $f(x) = 3x^{\frac{1}{2}};\ [0, 3]$

Average value of function: $2\sqrt{3} \approx 3.464$

Values that satisfy MVT: $\frac{4}{3} \approx 1.333$

6) $f(x) = 3x^{\frac{1}{2}};\ [0, 2]$

Average value of function: $2\sqrt{2} \approx 2.828$

Values that satisfy MVT: $\frac{8}{9} \approx 0.889$

7) $f(x) = (x-2)^{\frac{1}{2}}$; [2, 5]

Average value of function: $\frac{2\sqrt{3}}{3} \approx 1.155$

Values that satisfy MVT: $\frac{10}{3} \approx 3.333$

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

Average value of function: 2

Values that satisfy MVT: $\frac{22}{9} \approx 2.444$

9) $f(x) = \frac{1}{x^2}$; [−4, −2]

Average value of function: $\frac{1}{8} = 0.125$

Values that satisfy MVT: $-2\sqrt{2} \approx -2.828$

10) $f(x) = \frac{5}{x^2}$; [−3, −1]

Average value of function: $\frac{5}{3} \approx 1.667$

Values that satisfy MVT: $-\sqrt{3} \approx -1.732$

11) $f(x) = -\frac{4}{(x+3)^2}$; [−6, −5]

Average value of function: $-\frac{2}{3} \approx -0.667$

Values that satisfy MVT: $-3 - \sqrt{6} \approx -5.449$

12) $f(x) = -\frac{5}{(x+1)^2}$; [−5, −2]

Average value of function: $-\frac{5}{4} = -1.25$

Values that satisfy MVT: −3