Calculus Practice: Average Value of a Function 1a

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

A) Average value of function: 0
Values that satisfy MVT: 0

B) Average value of function: 6
Values that satisfy MVT: $-\frac{8}{3} \approx -2.667$

C) Average value of function: −1
Values that satisfy MVT: $-\frac{1}{2} = -0.5$

D) Average value of function: 1
Values that satisfy MVT: $\frac{1}{2} = 0.5$

2) $f(x) = -2x^2 + 4;\ [-2, -1]$

A) Average value of function: 2
Values that satisfy MVT: −1

B) Average value of function: $-\frac{2}{9} \approx -0.222$
Values that satisfy MVT: $-\frac{\sqrt{19}}{3} \approx -1.453$

C) Average value of function: 5
Values that satisfy MVT: $-\frac{5}{4} = -1.25$

D) Average value of function: $-\frac{2}{3} \approx -0.667$
Values that satisfy MVT: $-\frac{\sqrt{21}}{3} \approx -1.528$

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

A) Average value of function: $\frac{8\sqrt{3}}{3} \approx 4.619$
Values that satisfy MVT: $\frac{8}{3} \approx 2.667$

B) Average value of function: $\frac{\sqrt{3}}{3} \approx 0.577$
Values that satisfy MVT: $\frac{1}{3} \approx 0.333$

C) Average value of function: $\frac{2\sqrt{3}}{3} \approx 1.155$
Values that satisfy MVT: $\frac{4}{3} \approx 1.333$

D) Average value of function: $\frac{2\sqrt{11}}{3} \approx 2.211$
Values that satisfy MVT: $\frac{8}{3} \approx 2.667$

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

A) Average value of function: $\frac{4}{3} \approx 1.333$
Values that satisfy MVT: $\frac{4}{9} \approx 0.444$

B) Average value of function: $\frac{5}{3} \approx 1.667$
Values that satisfy MVT: $\frac{25}{36} \approx 0.694$

C) Average value of function: $\frac{5}{2} = 2.5$
Values that satisfy MVT: $\frac{1}{2} = 0.5$

D) Average value of function: 2
Values that satisfy MVT: 1

5) $f(x) = 5(2x-4)^{\frac{1}{2}}$; [2, 3]

A) Average value of function: $\frac{10\sqrt{2}}{3} \approx 4.714$

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

B) Average value of function: $\frac{20\sqrt{2}}{3} \approx 9.428$

Values that satisfy MVT: $\frac{7}{3} \approx 2.333$

C) Average value of function: $\frac{17\sqrt{2}}{13} \approx 1.849$

Values that satisfy MVT: $\frac{8739}{4225} \approx 2.068$

D) Average value of function: $\frac{4\sqrt{3}}{3} \approx 2.309$

Values that satisfy MVT: $\frac{158}{75} \approx 2.107$

6) $f(x) = -\frac{5}{x^2}$; [−2, −1]

A) Average value of function: 2

Values that satisfy MVT: $-\frac{3}{2} = -1.5$

B) Average value of function: 0

Values that satisfy MVT: $-\frac{3}{2} = -1.5$

C) Average value of function: $-\frac{5}{2} = -2.5$

Values that satisfy MVT: $-\sqrt{2} \approx -1.414$

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

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

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

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

Values that satisfy MVT: $\sqrt{6} \approx 2.449$

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

Values that satisfy MVT: $\frac{\sqrt{30}}{2} \approx 2.739$

C) Average value of function: 1

Values that satisfy MVT: $\sqrt{5} \approx 2.236$

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

Values that satisfy MVT: 2

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

A) Average value of function: 1

Values that satisfy MVT: 5

B) Average value of function: 10

Values that satisfy MVT: $\frac{9}{2} = 4.5$

C) Average value of function: 2

Values that satisfy MVT: $3 + \sqrt{2} \approx 4.414$

D) Average value of function: 4

Values that satisfy MVT: 4

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Values that satisfy MVT: 4