Quiz 6.2

Name

1.

t	1	5	8	13
$R(t)$	1	10	17	32

The differentiable function R is increasing, and the graph of R is concave down. Values of $R(t)$ at selected values of t are given in the table above. The trapezoidal sum $(5-1)\left(\frac{10+1}{2}\right)+(8-5)\left(\frac{17+10}{2}\right)+(13-8)\left(\frac{17+32}{2}\right)$ approximates $\int_1^{13} R(t)\,dt$. Which of the following statements is true?

(A) The trapezoidal sum is an underestimate for $\int_1^{13} R(t)\,dt$ because R is increasing.

(B) The trapezoidal sum is an overestimate for $\int_1^{13} R(t)\,dt$ because R is increasing.

(C) The trapezoidal sum is an underestimate for $\int_1^{13} R(t)\,dt$ because the graph of R is concave down.

(D) The trapezoidal sum is an overestimate for $\int_1^{13} R(t)\,dt$ because the graph of R is concave down.

2. Which of the following is the midpoint Riemann sum approximation of $\int_4^{6} \sqrt{x^3+1}\,dx$ using 4 subintervals of equal width?

(A) $\frac{1}{4}\left(\sqrt{4.25^3+1}+\sqrt{4.75^3+1}+\sqrt{5.25^3+1}+\sqrt{5.75^3+1}\right)$

(B) $\frac{1}{2}\left(\sqrt{4.25^3+1}+\sqrt{4.75^3+1}+\sqrt{5.25^3+1}+\sqrt{5.75^3+1}\right)$

(C) $\frac{1}{4}\left(\frac{\sqrt{4^3+1}+\sqrt{4.5^3+1}}{2}+\frac{\sqrt{4.5^3+1}+\sqrt{5^3+1}}{2}+\frac{\sqrt{5^3+1}+\sqrt{5.5^3+1}}{2}+\frac{\sqrt{5.5^3+1}+\sqrt{6^3+1}}{2}\right)$

(D) $\frac{1}{2}\left(\frac{\sqrt{4^3+1}+\sqrt{4.5^3+1}}{2}+\frac{\sqrt{4.5^3+1}+\sqrt{5^3+1}}{2}+\frac{\sqrt{5^3+1}+\sqrt{5.5^3+1}}{2}+\frac{\sqrt{5.5^3+1}+\sqrt{6^3+1}}{2}\right)$

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3.

x	0	a^2	$3a$	$6a$	$7a$
$f(x)$	1	-1	-3	-7	-9

The continuous function f is decreasing for all x. Selected values of f are given in the table above, where a is a constant with $0 < a < 3$. Let R be the right Riemann sum approximation for $\int_0^{7a} f(x)\,\square x$ using the four subintervals indicated by the data in the table. Which of the following statements is true?

(A) $R = (a^2 - 0) \cdot 1 + (3a - a^2) \cdot (-1) + (6a - 3a) \cdot (-3) + (7a - 6a) \cdot (-7)$ and is an underestimate for $\int_0^{7a} f(x)\,\square x$.

(B) $R = (a^2 - 0) \cdot 1 + (3a - a^2) \cdot (-1) + (6a - 3a) \cdot (-3) + (7a - 6a) \cdot (-7)$ and is an overestimate for $\int_0^{7a} f(x)\,\square x$.

(C) $R = (a^2 - 0) \cdot (-1) + (3a - a^2) \cdot (-3) + (6a - 3a) \cdot (-7) + (7a - 6a) \cdot (-9)$ and is an underestimate for $\int_0^{7a} f(x)\,\square x$.

(D) $R = (a^2 - 0) \cdot (-1) + (3a - a^2) \cdot (-3) + (6a - 3a) \cdot (-7) + (7a - 6a) \cdot (-9)$ and is an overestimate for $\int_0^{7a} f(x)\,\square x$.