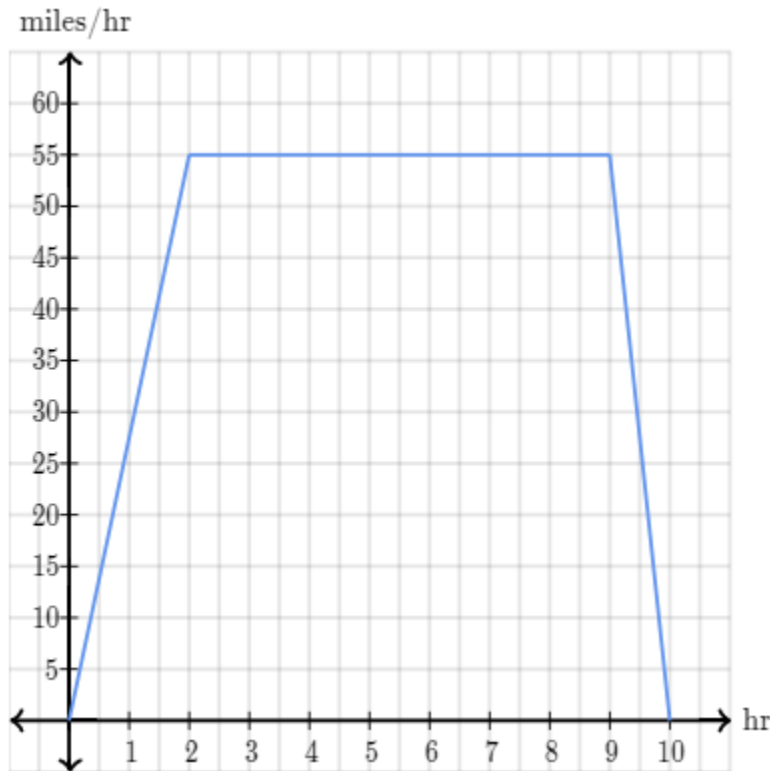


AP Calculus AB Unit 6 — Integration and Accumulation of Change Practice Test

Question 1

A freight train leaves the station on a 10-hour trip. The graph below shows the train's velocity as a function of time.



How far does the train travel?

- A. 55 miles
- B. 27.5 miles
- C. 467.5 miles
- D. 385 miles

Question 2

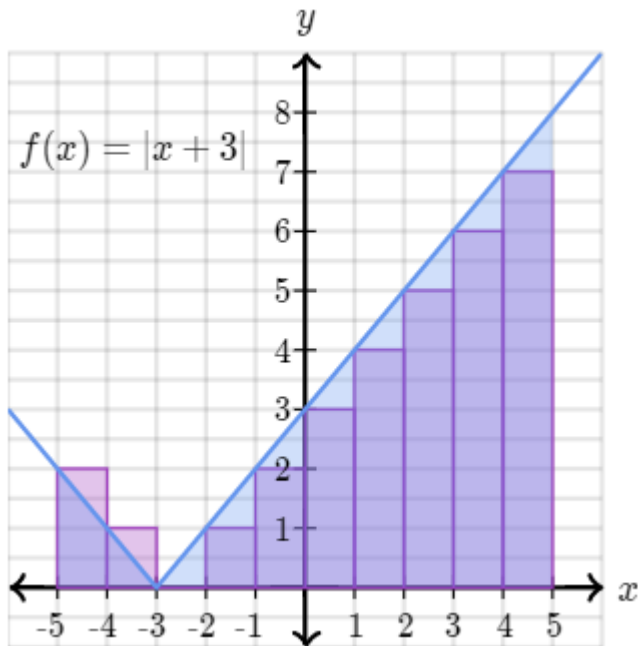
Use a left hand Riemann sum with 4 equal intervals to find the approximation of the area between the graph of the function $f(x) = \frac{x}{2} + 5$ and the x -axis on the interval $[3, 7]$.

- A. 58
- B. 30

- C. 29
- D. 28

Question 3

The following graph shows a Riemann sum:



Which of the following approximates the area between $f(x)$ and the x -axis on the interval $[-5, 5]$ using a left Riemann sum with 10 equal subdivisions?

- A. $\sum_{i=0}^9 |i - 2| \cdot 10$
- B. $\sum_{i=0}^9 |i - 2|$ correct answer
- C. $\sum_{i=0}^9 |i - 3| \cdot 10$
- D. $\sum_{i=0}^9 |0.5i - 2| \cdot 0.5$

Question 4

Consider the sum $4+25+64+121$. Which expression is equal to the above sum?

A. $\sum_{i=0}^3 (i^2 + 2i + 4)$

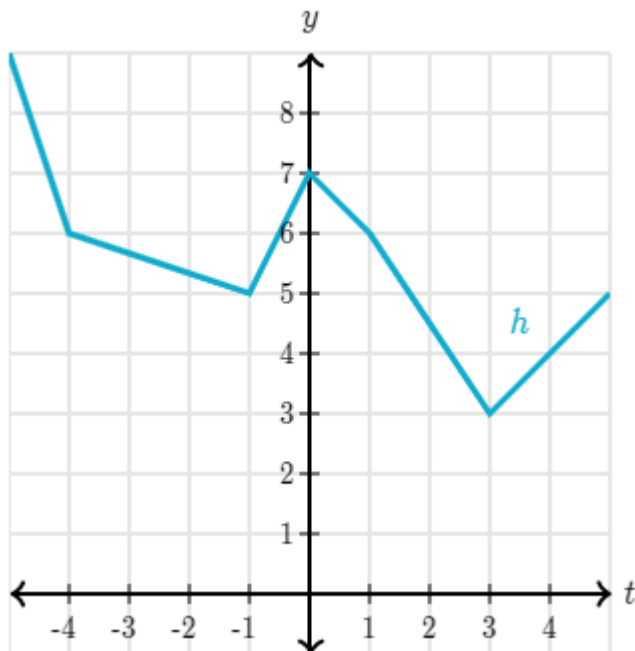
B. $\sum_{i=0}^3 (3i + 2)^2$

C. None of the above

correct answer

Question 5

The graph of function h is shown below. Let $f(x) = \int_{-4}^x h(t) dt$.

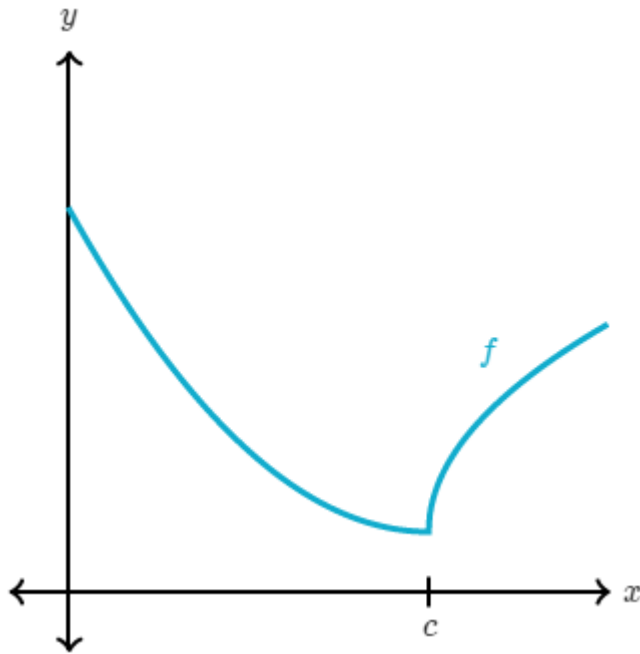


Evaluate $f(-1)$.

- A. $f(-1)=5$
- B. $f(-1)=16.5$
- C. $f(-1)=12.5$
- D. $f(-1)=3$

Question 6

This is the graph of f .



Let $g(x) = \int_0^x f(t) dt$. What is an appropriate calculus-based justification for the fact that g has an inflection point at $x=c$?

- A. f is positive.
- B. f has a relative minimum at $x=c$.
- C. f has an inflection point at $x=c$.

Question 7

Evaluate $\int_0^5 (3x^2 + 7x + 4) dx$.

- A. 0
- B. 54
- C. 169
- D. 232.5

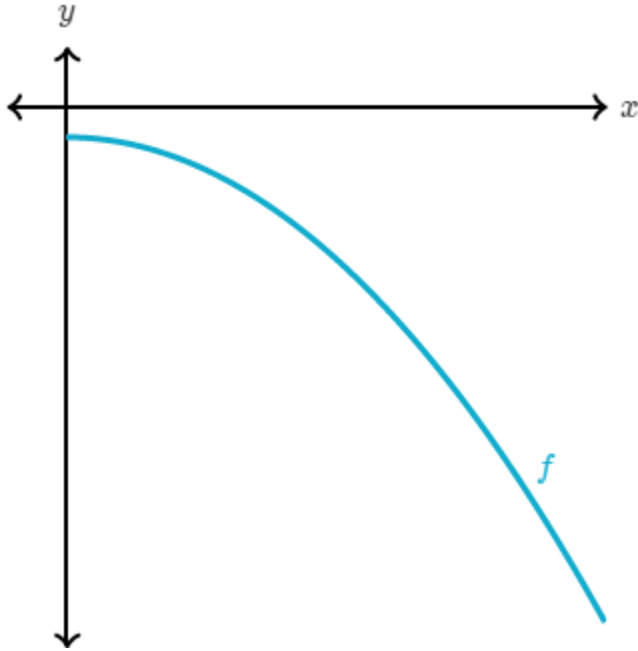
Question 8

Evaluate $\int_0^7 3x^2 e^{x^3} dx$.

- A. $e^{147} - 1$
- B. $e^{243} - 1$
- C. $e^{512} - 1$
- D. $e^{1701} - 1$

Question 9

This is the graph of f .



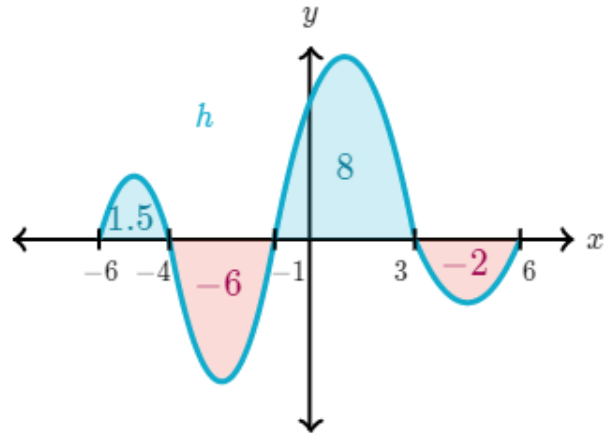
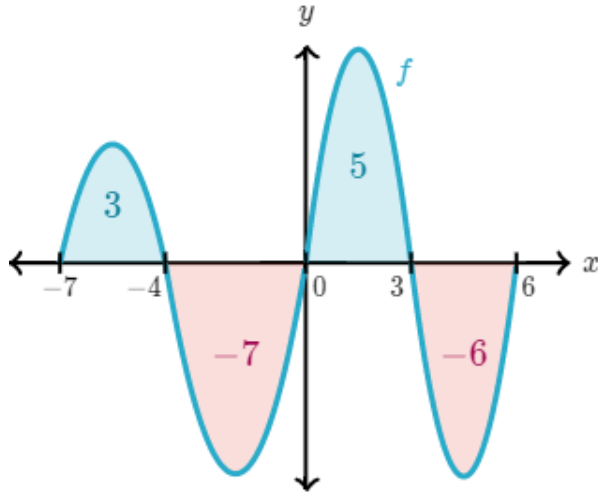
Let $g(x) = \int_0^x f(t) dt$. What is an appropriate calculus-based justification for the fact that g is concave down?

- A. f is negative.
- B. f is decreasing.
- C. f is concave down.

Question 10

Evaluate

$$\int_3^6 [f(x) + h(x)] dx .$$



- A. -8
- B. -2
- C. -6
- D. -10

Question 11

Find the area under a curve defined by the equation $5x^4 + 3x + 7$ between the x -values 0 and 4.

- A. 1200
- B. $\frac{1}{12}$
- C. 1134
- D. 1076

Question 12

Solve $\int_0^2 (2x^3 - 6x + \frac{3}{x^2 + 1})$ using the Fundamental Theorem of Calculus.

- A. $-2 + \cos^{-1}(2)$
- B. $-4 + 3 \tan^{-1}(2)$
- C. $\sin^{-1}(2)$
- D. $\sin(0) + 2$
- E. $-4 + 3 \tan(2)$

Question 13

Use a change of variable (u-substitution) to evaluate the integral $\int x\sqrt{1+x^2} dx$

- A. $\frac{1}{6}(2x+1)^{\frac{2}{3}}+C$
- B. $\frac{1}{3}(x^2+1)^{\frac{3}{2}}+C$
- C. $\frac{1}{3}x^{\frac{3}{2}}+C$
- D. $\frac{1}{6}(x^2+1)^{\frac{2}{3}}+\sqrt{x}+C$
- E. $\frac{3}{4}(x^2+1)^{\frac{3}{2}}+C$

Question 14

Evaluate $\int (-2x^{-3}+6x^{-4}) dx$

- A. $\frac{1}{x^3}-\frac{2}{x^4}+C$
- B. $\frac{1}{x^2}-\frac{2}{x^3}+C$
- C. $4x+C$
- D. $\frac{-2}{x^2}+\frac{6}{x^3}+C$

Question 15

Evaluate $\int 3e^x dx$

- A. $\frac{e^x}{3}$
- B. e^x+C
- C. $\frac{3e^{x+1}}{x+1}+C$
- D. $3e^x+C$

Question 16

Integrate $\int 10 \sin(x) dx$

- A. $10 \sin(x) + C$
- B. $-10 \sin(x) + C$
- C. $-10 \cos(x) + C$
- D. $10 \cos(x) + C$

Question 17

$$f(x) = \begin{cases} 6x & \text{for } x > 0 \\ 3x^2 - 2x & \text{for } x \leq 0 \end{cases}$$

Evaluate the definite integral.

$$\int_{-2}^2 f(x) dx = ?$$

- A. 8
- B. 16
- C. 24
- D. 32

Question 18

Evaluate $\int \frac{x^3 - 1}{x + 2} dx$.

- A. $\frac{x^3}{3} - x^2 + 4x - 7 \ln|x+2| + C$
- B. $\frac{x^3}{3} - 2x^2 + 4x - 7 \ln|x+2| + C$
- C. $\frac{x^3}{3} - x^2 + 4x - 9 \ln|x+2| + C$
- D. $\frac{x^3}{3} - 2x^2 + 4x - 9 \ln|x+2| + C$

Question 19

Find $\int \frac{1}{\sqrt{-x^2 - 6x + 40}} dx$.

A. $\frac{1}{14} \arctan\left(\frac{x+3}{7}\right) + C$

B. $\arctan\left(\frac{x+3}{7}\right) + C$

C. $\frac{1}{14} \arcsin\left(\frac{x+3}{7}\right) + C$

D. $\arcsin\left(\frac{x+3}{7}\right) + C$

Answer Key

1. C
2. C
3. B
4. B
5. B
6. B
7. D
8. B
9. B
10. A
11. D
12. B
13. B
14. B
15. D
16. C
17. C
18. C
19. D