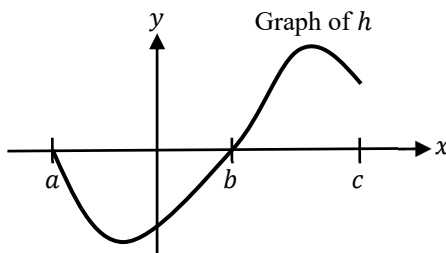


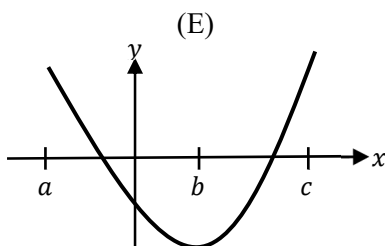
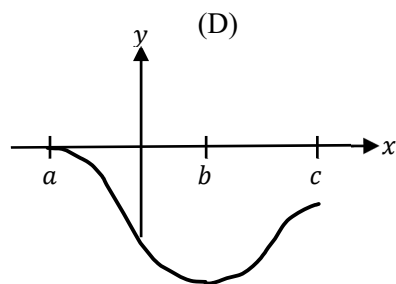
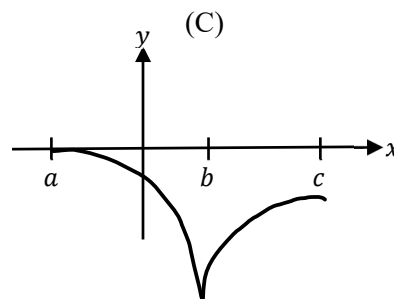
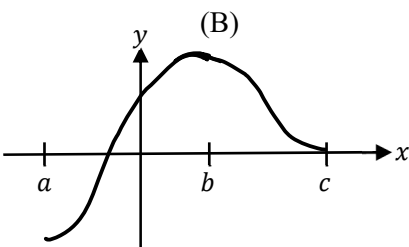
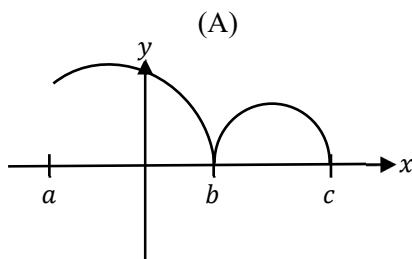
Name: _____ Date: _____

End of Unit 6 CA – Integration and Accumulation of Change

1. Let $f(x) = \int_a^x h(t) dt$, where h has the graph shown below.

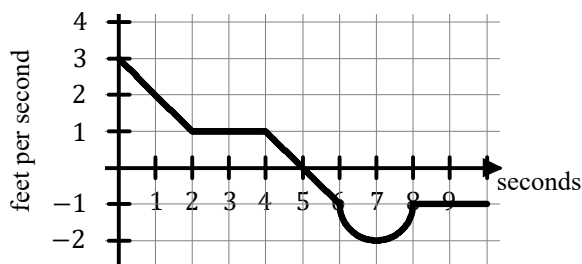


Which of the following could be the graph of f ?

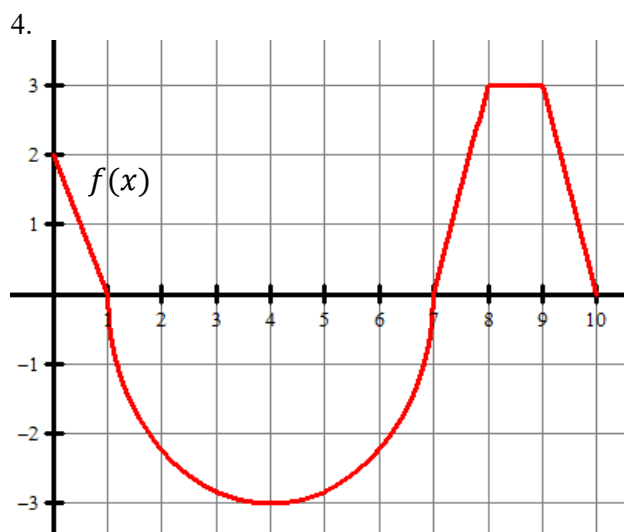


2. Let f and g be continuous functions such that $\int_0^{10} f(x) dx = 21$, $\int_0^{10} \frac{1}{2}g(x) dx = 8$, and $\int_3^{10} (f(x) - g(x)) dx = 2$. What is the value of $\int_0^3 (f(x) - g(x)) dx$?

3. The graph below shows the velocity of a particle moving along the y -axis, measured in feet per second.



How far is the particle from its starting position after 10 seconds?



$$(a) \int_0^1 2f(x)dx =$$

$$(b) \int_1^7 f(x)dx =$$

$$(c) \int_0^7 f(x)dx =$$

$$(d) \int_{10}^7 f(x)dx =$$

$$(e) \int_8^8 f(x)dx =$$

$$(f) \int_0^{10} f(x)dx =$$

Find the value of the definite integral.

5. $\int_2^3 \left(\frac{1}{x^2} + 4x^3 \right) dx$

6. $\int_{-1}^8 x^{2/3} dx$

7. $\int_0^1 x\sqrt{1-x^2} dx$

8. $\int_{-1}^0 \frac{x}{x^2+1} dx$

9. $\int_0^1 \frac{y^2+2y}{\sqrt[3]{y^3+3y^2+4}} dy$

10. If $\int_4^{-10} g(x) dx = -3$ and $\int_4^6 g(x) dx = -2$, find $\int_{-10}^6 g(x) dx =$

11. $\int_0^{e-1} \frac{4}{x+1} dx$

- (A) 4 (B) $4e$ (C) 0 (D) $-4e$ (E) -4

12. $\int \sin(2x) \cos(2x) dx$

- (A) $\frac{1}{2} \sin^2(2x) + C$ (B) $-\frac{1}{2} \cos^2(2x) + C$ (C) $\frac{1}{4} \sin^2(2x) + C$
- (D) $\frac{1}{4} \cos^2(2x) + C$ (E) $\frac{1}{2} \sin^2(2x) \cos(2x) + C$

13. **Calculator active problem.** The table below contains values of a continuous increasing function f at several values of x .

x	1	3	7	10	12	15
$f(x)$	0.14	0.21	0.28	0.36	0.44	0.54

- a. Use a left endpoint Riemann sum with three subintervals to approximate $\int_3^{12} f(x) dx$.

- b. Is your approximation an overestimate or underestimate of the true value? Explain why.

Find the following indefinite integrals.

14. $\int \left(\frac{8x^2 + 3x - 6}{x} \right) dx$

15. $\int \frac{1}{x\sqrt{x}} dx$

16. $\int \sec^2 x \, dx$

17. $\int \frac{e^{2x}}{e^{2x} + 1} dx$

18. $\int \frac{x^3 - \sqrt{x}}{\sqrt{x}} dx$

19. $\int x^3 \cos(x^4) \, dx$

20. $\int \frac{14x^2 - 29x - 69}{2x - 7} dx$

21. $\int \frac{1}{\sqrt{-x^2 + 6x - 8}} dx$

22. $\int 4x \ln 3x \, dx$

23. $\int 3x^2 e^x \, dx$

24. $\int_2^4 \frac{3x}{(x-1)(x+3)} \, dx$

25. $\int \frac{2x-3}{x^3+5x^2+6x} \, dx$

26. $\int_{-\infty}^0 \frac{1}{(2x-1)^3} \, dx$

27. $\int_0^1 \frac{1}{\sqrt{1-x^2}} \, dx$

28. $\int_0^{\infty} e^{-2x} dx$

29. If $f'(x) = 8x^3 + 1$ and $f(1) = 5$, then $f(2) =$

30. **Calculator active problem.** If $f'(x) = e^{\cos x}$ and $f(-1) = 3.31$, then $f(0) =$

Answers

1. D		2. 3		3. $2 - \frac{\pi}{2}$		4a. 2 4b. $-\frac{9\pi}{2}$ 4c. $1 - \frac{9\pi}{2}$		4d. -6 4e. 0 4f. $7 - \frac{9\pi}{2}$			
5. $65\frac{1}{6} = \frac{391}{6}$		6. $\frac{99}{5}$		7. $\frac{1}{3}$		8. $\ln\left(\frac{1}{\sqrt{2}}\right)$		9. $2 - \frac{1}{2}\sqrt[3]{16}$		10. 1	
11. 4		12. C		13. 2.4		13b. Underestimate because it is a Left Riemann Sum with an increasing function.					
14. $4x^2 + 3x - 6\ln x + C$				15. $-\frac{2}{\sqrt{x}} + C$				16. $\tan x + C$			
17. $\frac{1}{2}\ln e^{2x} + 1 + C$				18. $\frac{2}{7}x^{\frac{7}{2}} - x + C$				19. $\frac{1}{4}\sin(x^4) + C$			
20. $\frac{7}{2}x^2 + 10x + \frac{1}{2}\ln 2x - 7 + C$				21. $\sin^{-1}(x - 3) + C$				22. $2x^2 \ln 3x - x^2 + C$			
23. $3x^2e^x - 6xe^x + 6e^x + C$						24. $\frac{3}{4}\ln 3 + \frac{9}{4}\ln \frac{7}{5}$					
25. $-\frac{1}{2}\ln x + 3\ln x + 3 + \frac{7}{2}\ln x + 2 + C$						26. $-\frac{1}{4}$				27. $\frac{\pi}{2}$	
28. $\frac{1}{2}$				29. 36				30. 5.6515			