4.1/4.3. Extra Practice

1.

If $f'(x) = 12x^2 - 6x + 1$, $f(1) = 5$, then $f(0)$ equals

(A) 2 (B) 3 (C) 4 (D) -1 (E) 0

2.

Find all functions g such that $g'(x) = \dfrac{5x^2 + 4x + 5}{\sqrt{x}}$

(A) $g(x) = 2\sqrt{x}\left(x^2 + \frac{4}{3}x - 5\right) + C$ (B) $g(x) = 2\sqrt{x}\left(x^2 + \frac{4}{3}x + 5\right) + C$

(C) $g(x) = 2\sqrt{x}\left(5x^2 + 4x - 5\right) + C$ (D) $g(x) = \sqrt{x}\left(x^2 + \frac{4}{3}x + 5\right) + C$

(E) $g(x) = \sqrt{x}\left(5x^2 + 4x + 5\right) + C$

3.

Determine $f(t)$ when $f''(t) = 2(3t + 1)$ and $f'(1) = 3$, $f(1) = 5$.

(A) $f(t) = 3t^3 - 2t^2 + 2t + 2$ (B) $f(t) = t^3 - 2t^2 + 2t + 4$

(C) $f(t) = 3t^3 + t^2 - 2t + 3$ (D) $f(t) = t^3 - t^2 + 2t + 3$

(E) $f(t) = t^3 + t^2 - 2t + 5$

4.

Consider the following functions:

I. $F_1(x) = \dfrac{\sin^2 x}{2}$

II. $F_2(x) = -\dfrac{\cos 2x}{4}$

III. $F_3(x) = -\dfrac{\cos^2 x}{2}$

Which are antiderivatives of $f(x) = \sin x \cos x$? (Hint: take the derivative of each and manipulate)

(A) II only (B) I only (C) I & III only (D) I, II, & III (E) I & II only

5.

A particle moves along the x-axis. The velocity of the particle at time t is $6t - t^2$. What is the total distance traveled by the particle from time $t = 0$ to $t = 3$?

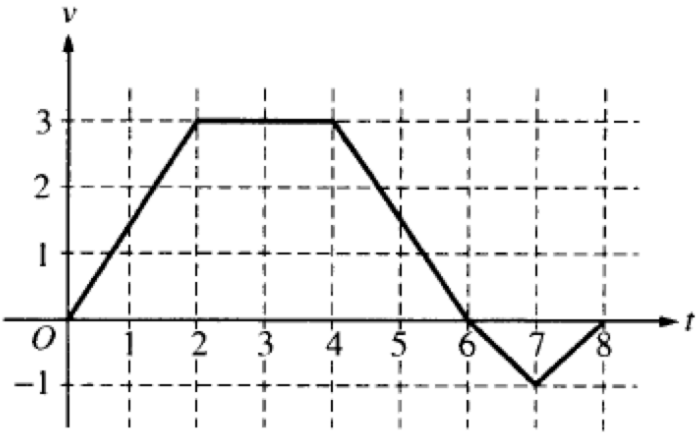
(A) 3 (B) 6 (C) 9 (D) 18 (E) 27

6.

A particle moves along the x-axis so that its acceleration at time t is $a(t) = 8 - 8t$ in units of feet and seconds. If the velocity of the particle at $t = 0$ is 12 ft/sec, how many seconds will it take for the particle to reach its furthest point to the right?

(A) 6 seconds (B) 5 seconds (C) 3 seconds (D) 7 seconds (E) 4 seconds

7. & 8.



A bug begins to crawl up a vertical wire at time $t = 0$. The velocity v of the bug at time t, $0 \le t \le 8$, is given by the function whose graph is shown above.

At what value of t does the bug change direction?

(A) 2 (B) 4 (C) 6 (D) 7 (E) 8

What is the total distance the bug traveled from $t = 0$ to $t = 8$?

(A) 14 (B) 13 (C) 11 (D) 8 (E) 6

9.

If $\int_2^5 f(x)dx = 18$, then $\int_2^5 \left(f(x)+4\right)dx =$

(A) 20 (B) 22 (C) 23 (D) 25 (E) 30

10.

$$\int_{-4}^{4} \left(4 - |x|\right)dx =$$

(A) 0 (B) 4 (C) 8 (D) 16 (E) 32

11.

If $\int_a^b f(x)\,dx = a+2b$, then $\int_a^b \big(f(x)+3\big)\,dx =$

(A) $a+2b+3$ (B) $3b-3a$ (C) $4a-b$ (D) $5b-2a$ (E) $5b-3a$

12.

Given that $\int_4^9 \sqrt{x}\,dx = \frac{38}{3}$, using your knowledge of transformations, what is

(a) $\int_9^4 \sqrt{t}\,dt$ (b) $\int_4^9 \big(\sqrt{x}+3\big)\,dx$ (c) $\int_9^{14} \sqrt{x-5}\,dx$ (d) $\int_4^4 \sqrt{x}\,dx$

13.

$$f(x) = \begin{cases} x & \text{for } x < 2 \\ 3 & \text{for } x \geq 2 \end{cases}$$

If f is the function defined above, then $\int_{-1}^{4} f(x)\,dx$ is

(A) $\frac{9}{2}$

(B) $\frac{15}{2}$

(C) $\frac{17}{2}$

(D) undefined

14. (calculator permitted)

A race car is traveling on a straight track at a velocity of 80 meters per second when the brakes are applied at time $t = 0$ seconds. From time $t = 0$ to the moment the race car stops, the acceleration of the race car is given by $a(t) = -6t^2 - t$ meters per second per second. During this time period, how far does the race car travel?

(A) 188.229 m

(B) 198.766 m

(C) 260.042 m

(D) 267.089 m

ANSWERS

1. B
2. B
3. E
4. D
5. D
6. C
7. C
8. B
9. E
10. D
11. D
12.
    a. -38/3
    b. 83/3
    c. 38/3
    d. 0
13.
14.