Integrals Practice

1. Using a left Riemann sum with three subintervals $[0,1]$, $[1,2]$, and $[2,3]$, what is the approximation of $\int_0^3 (3-x)(x+1)\,dx$?

(A) 7.5 (B) 9 (C) 10 (D) 11.5

2.

x	1	3	5	8	10
$f(x)$	7	12	16	23	17

The function f is continuous on the closed interval $[1,10]$ and has values as shown in the table above. Using a right Riemann sum with four subintervals $[1,3]$, $[3,5]$, $[5,8]$, $[8,10]$, what is the approximation of $\int_1^{10} f(x)\,dx$?

(A) 96 (B) 116 (C) 132 (D) 159

3. The expression $\frac{1}{20}\left[\left(\frac{1}{20}\right)^2+\left(\frac{2}{20}\right)^2+\left(\frac{3}{20}\right)^2+\ldots+\left(\frac{20}{20}\right)^2\right]$ is a Riemann sum approximation for

(A) $\frac{1}{20}\int_0^{20} x^2\,dx$ (C) $\int_0^1 x^2\,dx$

(B) $\frac{1}{20}\int_0^1 x^2\,dx$ (D) $\int_0^1 \frac{1}{x^2}\,dx$

4. If n is a positive integer, then $\lim_{n\to\infty}\frac{1}{n}\left[\left(\frac{1}{n}\right)^2+\left(\frac{2}{n}\right)^2+\cdots+\left(\frac{n}{n}\right)^2\right]$ can be expressed as

(A) $\int_0^1 \frac{1}{x}\,dx$ (B) $\int_0^1 \frac{1}{x^2}\,dx$ (C) $\int_0^1 x^2\,dx$ (D) $\frac{1}{2}\int_0^1 x^2\,dx$

5. If four equal subdivisions on $[0,2]$ are used, what is the trapezoidal approximation of $\int_0^2 e^x\,dx$?

(A) $\frac{1}{4}\left[1+2\sqrt{e}+2e+2e\sqrt{e}+e^2\right]$ (C) $\frac{1}{4}\left[1+\sqrt{e}+e+e\sqrt{e}+e^2\right]$

(B) $\frac{1}{2}\left[1+2\sqrt{e}+2e+2e\sqrt{e}+e^2\right]$ (D) $\frac{1}{2}\left[1+\sqrt{e}+e+e\sqrt{e}+e^2\right]$

6.

x	1	3	5	9	12
$f(x)$	4	10	14	11	7

A function f is continuous on the closed interval $[1,12]$ and has values that are given in the table above. Using subintervals $[1,3]$, $[3,5]$, $[5,9]$, and $[9,12]$, what is the trapezoidal approximation of $\int_1^{12} f(x)\,dx$?

(A) 97 (B) 115 (C) 128 (D) 136

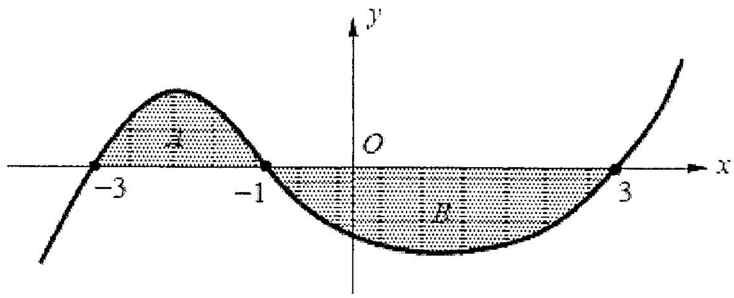
7. If $\int_a^b f(x)\,dx = 2a - 5b$, then $\int_a^b [f(x) - 2]\,dx =$

(A) $-7b$ (B) $-3b$ (C) $4a - 7b$ (D) $4a - 3b$

8. If $\int_1^6 f(x)\,dx = \frac{15}{2}$ and $\int_6^4 f(x)\,dx = 5$, then $\int_1^4 f(x)\,dx =$

(A) $\frac{5}{2}$ (B) $\frac{9}{2}$ (C) $\frac{19}{2}$ (D) $\frac{25}{2}$

9.



The graph of $y = f(x)$ is shown in the figure above. If A and B are positive numbers that represent the areas of the shaded regions, what is the value of $\int_{-3}^{3} f(x)\,dx - 2\int_{-1}^{3} f(x)\,dx$, in terms of A and B ?

(A) $-A-B$ (B) $A+B$ (C) $A-2B$ (D) $A-B$

10. If $\frac{dy}{dx} = 3x^2 - 1$, and if $y = -1$ when $x = 1$, then $y =$

(A) $x^3 - x + 1$ (C) $-x^3 + x - 1$

(B) $x^3 - x - 1$ (D) $-x^3 + 1$

11. $\int (x^2 - 2)\sqrt{x}\,dx =$

(A) $\frac{2}{5}x^2\sqrt{x} - \frac{2}{3}x\sqrt{x} + C$ (C) $\frac{2}{7}x^3\sqrt{x} - \frac{4}{3}x\sqrt{x} + C$

(B) $\frac{2}{5}x^2\sqrt{x} - \frac{4}{3}x\sqrt{x} + C$ (D) $\frac{2}{7}x^3\sqrt{x} - \frac{2}{3}x^2\sqrt{x} + C$

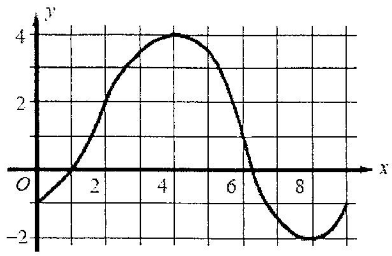
12. $\int_0^3 \frac{dx}{\sqrt{1+x}} =$

(A) 2 (B) 2.5 (C) 3 (D) 4

13. $\frac{d}{dx}\int_1^{x^2} \sqrt{3+t^2}\,dt =$

(A) $\sqrt{3+x^2}$ (B) $\sqrt{3+x^4}$ (C) $2x\sqrt{3+x^4}$ (D) $2\sqrt{3+x^2}$

14.



graph of g

The graph of the function g, shown in the figure above, has horizontal tangents at $x = 4$ and $x = 8$. If $f(x) = \int_0^{\sqrt{x}} g(t)\,dt$, what is the value of $f'(4)$?

(A) 0 (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) $\frac{3}{2}$

15. $\int_0^1 \frac{x}{e^{x^2}}\,dx =$

(A) $e-1$ (B) $(1-\frac{1}{e})$ (C) $\frac{1}{2}(1-\frac{1}{e})$ (D) $\frac{1}{2}(1-\frac{1}{e^2})$

16. $\int_1^e \frac{\cos(\ln x)}{x}\,dx =$

(A) $\frac{1}{\sin 1}$ (B) $\frac{1}{\cos 1}$ (C) $\sin(e)$ (D) $\sin 1$