Techniques of Integration

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. $\int_0^{\frac{\pi}{4}} \sin x\,dx =$

2003 #5

a. $-\frac{\sqrt{2}}{2}$
b. $\frac{\sqrt{2}}{2}$
c. $-\frac{\sqrt{2}}{2} - 1$
d. $-\frac{\sqrt{2}}{2} + 1$
e. $\frac{\sqrt{2}}{2} - 1$

____ 2. $\int_0^1 e^{-4x}\,dx =$

2003 #2

a. $\frac{-e^{-4}}{4}$
b. $-4e^{-4}$
c. $e^{-4} - 1$
d. $\frac{1}{4} - \frac{e^{-4}}{4}$
e. $4 - 4e^{-4}$

____ 3. $\frac{1}{2}\int e^{\frac{t}{2}}\,dt =$

1997 #6

a. $e^{-t} + C$
b. $e^{-\frac{t}{2}} + C$
c. $e^{\frac{t}{2}} + C$
d. $2e^{\frac{t}{2}} + C$
e. $e^{t} + C$

____ 4. $\int x^2 \cos\left(x^3\right)dx =$

2003 #8

a. $-\frac{1}{3}\sin\left(x^3\right) + C$
b. $\frac{1}{3}\sin\left(x^3\right) + C$
c. $-\frac{x^3}{3}\sin\left(x^3\right) + C$
d. $\frac{x^3}{3}\sin\left(x^3\right) + C$
e. $\frac{x^3}{3}\sin\left(\frac{x^4}{4}\right) + C$

____ 5. Using the substitution $u = 2x + 1$, $\int_0^2 \sqrt{2x+1}\,dx$ is equivalent to

2003 #11

a. $\frac{1}{2}\int_{-\frac{1}{2}}^{\frac{1}{2}} \sqrt{u}\,du$
b. $\frac{1}{2}\int_0^2 \sqrt{u}\,du$
c. $\frac{1}{2}\int_1^5 \sqrt{u}\,du$
d. $\int_0^2 \sqrt{u}\,du$
e. $\int_1^5 \sqrt{u}\,du$

____ 6. $\int_1^e \left(\frac{x^2 - 1}{x}\right)dx =$

1998 #7

a. $e - \frac{1}{e}$
b. $e^2 - e$
c. $\frac{e^2}{2} - e + \frac{1}{2}$
d. $e^2 - 2$
e. $\frac{e^2}{2} - \frac{3}{2}$

____ 7. What are all values of k for which $\int_{-3}^{k} x^2\,dx = 0$?

1998 #20

a. -3
b. 0
c. 3
d. -3 and
e. 3-3, 0, and 3

____ 8. $\int_1^2 \left(4x^3 - 6x\right)dx =$

1997 #1

a. 2
b. 4
c. 6
d. 36
e. 42

____ 9. What is the average value of $y = x^2\sqrt{x^3+1}$ on the interval [0, 2] ?

a. $\frac{26}{9}$

b. $\frac{52}{9}$

c. $\frac{26}{3}$

d. $\frac{52}{3}$

e. 24

____ 10. If f is the antiderivative of $\frac{x^2}{1+x^5}$ such that $f(1) = 0$, then $f(4) =$

a. -0.012
b. 0
c. 0.016
d. 0.376
e. 0.629

____ 11. Let $F(x)$ be an antiderivative of $\frac{(\ln x)^3}{x}$. If $F(1) = 0$, then $F(9) =$

a. 0.048
b. 0.144
c. 5.827
d. 23.308
e. 1,640.250

____ 12. If $f(x) = g(x) + 7$ for $3 \le x \le 5$, then $\int_3^5 [f(x) + g(x)]dx =$

a. $2\int_3^5 g(x)dx + 7$

b. $2\int_3^5 g(x)dx + 14$

c. $2\int_3^5 g(x)dx + 28$

d. $\int_3^5 g(x)dx + 7$

e. $\int_3^5 g(x)dx + 14$

Techniques of Integration

___ 13. If $\int_a^b f(x)dx = a + 2b$, then $\int_a^b (f(x)+5)dx =$

1997 #3

A) $a + 2b + 5$
B) $5b - a$
C) $7b - 4a$
D) $7b - 5a$
E) $7b - 6a$

___ 14. $\int_0^{\frac{\pi}{4}} \frac{e^{\tan x}}{\cos^2 x} dx$ is

1997 #18

A) 0
B) 1
C) $e - 1$
D) E
E) $e + 1$

___ 15. If f is a linear function and $0 < a < b$, then $\int_a^b f''(x)\,dx =$

1998 #11

A) 0
B) 1
C) $\frac{ab}{2}$
D) $b - a$
E) $\frac{b^2 - a^2}{2}$

___ 16. $\int_1^2 \frac{1}{x^2} dx =$

1998 #3

A) $-\frac{1}{2}$
B) $\frac{7}{24}$
C) $\frac{1}{2}$
D) 1
E) $2\ln 2$

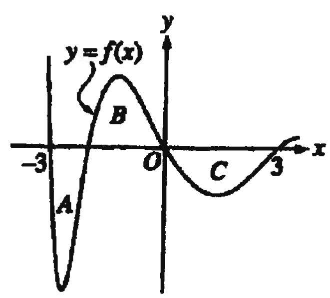
___ 17. $\int_0^x \sin t\, dt =$

1998 #5

A) $\sin x$
B) $-\cos x$
C) $\cos x$
D) $\cos x - 1$
E) $1 - \cos x$

18.

2003 #77



The regions *A*, *B*, and C in the figure above are bounded by the graph of the function f and the x-axis. If the area of each region is 2, what is the value of $\int_{-3}^{3} (f(x)+1)dx$?

A) -2
B) -1
C) 4
D) 7
E) 12