Integrals and U-Substitution with e and ln

1. $\int_{-2}^{2} 3e^{-x}\,dx =$
   a. $3e^{-2}$
   b. $-3e^{2}$
   c. $6\left(1-e^{-2}\right)$
   d. $3\left(e^{2}-e^{-2}\right)$
   e. $3\left(e^{-2}-e^{2}\right)$

2. At what point does $\left(f^{-1}\right)(x)$ have a instantaneous slope of ¼, if $f(x)=x^4-28x+3$?
   a. $(2,-37)$
   b. $(75,-2)$
   c. $(-2,75)$
   d. $(-37,2)$
   e. $(4,147)$

3. $\int \sec^2 x\,dx =$
   a. $\tan x + C$
   b. $\csc^2 x + C$
   c. $\cos^2 x + C$
   d. $\frac{\sec^3 x}{3} + C$
   e. $2\sec^2 x\ \tan x + C$

4. $\int x^2 e^{x^3} dx =$
   a. $x^2 e^{x^3} + C$
   b. $x^2 e^{x^3} - 2xe^{x^3} + 2e^{x^3} + C$
   c. $\frac{1}{3} e^{x^3} + C$
   d. $x^2 e^{x^3} + 2xe^{x^3} + 2e^{x^3} + C$
   e. $3e^{x^3} + C$

5. If $y = 5^{7-2x^2}$, then $\frac{dy}{dx}$ at x = 1 is approximately:
   a. 5
   b. 25
   c. 3125
   d. 5029.494
   e. -20117.974

6. $\int \frac{e^x}{e^x+1}\,dx =$
   a. $e^x + C$
   b. $\tan^{-1}\left(e^x+1\right)+C$
   c. $\ln\left(e^x+1\right)+C$
   d. $\frac{e^x}{e^x+1}+C$
   e. $\frac{e^x+1}{e^x}+C$

7. $\frac{d}{dx}\left[\ln\left(\tan x+\sec x\right)\right] =$
   a. $\frac{1}{\tan x+\sec x}$
   b. $\sec^2 x+\sec x\tan x$
   c. $\frac{\sec^2 x+\tan x}{\tan x+\sec x}$
   d. $\sec x$

8. If $x+\sin y=\ln y$ then $\frac{dy}{dx}$ = ?
   a. $\frac{y}{1-y\cos y}$
   b. $y+y\cos y$
   c. $\frac{y}{y\cos y-1}$
   d. $\frac{1-y}{y\cos y}$
   e. $\frac{y+\cos y-1}{y}$

9. $\int_0^{\frac{\pi}{3}} \sin(3x)dx =$
   a. –2
   b. –2/3
   c. 0
   d. 2/3
   e. 2

10. $\int \frac{4\tan 3x}{5}\,dx =$
    a. $-\frac{12}{5}\ln\left|\cos 3x\right| + C$
    b. $\frac{4}{15}\ln\left|\sec 3x\right| + C$
    c. $\frac{4}{15}\ln\left|\sec 3x\tan 3x\right| + C$
    d. $\frac{4}{15}\sec^2 3x + C$

11. $\int \frac{x^3-4x-1}{x-2}dx$
    a. $\frac{1}{3}x^3+x^2+\ln\left|x-2\right|+C$
    b. $\frac{1}{3}x^3+x^2+3\ln\left|x-2\right|+C$

c. $\frac{1}{3}x^3+x^2-\ln|x-2|+C$

d. $x^2+2x+\frac{1}{x-2}+C$

e. $\frac{x^2}{2}+2x+\frac{1}{x-2}+C$

12. $\frac{d}{dx}\left(\log_4 3x^2\right)=$

a. $\frac{2}{x}$

b. $\frac{\ln 16}{x}$

c. $\frac{\ln\left(3x^2\right)}{\ln 4}$

d. $\frac{2}{x\ln 4}$

13. $\int 2^{5x}\,dx=$

a. $\frac{2^{5x+1}}{5x+1}+C$

b. $\frac{2^{5x}\ln 2}{5}+C$

c. $\frac{2^{5x}}{\ln 32}+C$

d. $\frac{2^{5x}}{\ln 5}+C$

14. $\int \tan(2x)\,dx=$

a. $-2\ln|\cos(2x)|+C$

b. $-\frac{1}{2}\ln|\cos(2x)|+C$

c. $\frac{1}{2}\ln|\cos(2x)|+C$

d. $2\ln|\cos(2x)|+C$

e. $\frac{1}{2}\sec(2x)\tan(2x)+C$

15. $\int \cos^2 x\sin x\,dx=$

a. $-\frac{\cos^3 x}{3}+C$

b. $-\frac{\cos^3 x\sin^2 x}{6}+C$

c. $\frac{\sin^2 x}{2}+C$

d. $\frac{\cos^3 x}{3}+C$

e. $\frac{\cos^3 x\sin^2 x}{6}+C$

16. Given $f(x)=\begin{cases}x+1, & x<0\\ \cos\pi x, & x\ge 0\end{cases}$, $\int_{-1}^{1} f(x)dx=$

a. $\frac{1}{2}+\frac{1}{\pi}$

b. –1/2

c. $\frac{1}{2}-\frac{1}{\pi}$

d. ½

e. $-\frac{1}{2}+\pi$

17. Find $\frac{dy}{dx}$ if $y=3^{4-x^2}$

a. $(\ln 3)3^{4-x^2}$

b. $-2x(\ln 3)3^{4-x^2}$

c. $-2x\left(4-x^2\right)\ln 3$

d. $(-2x)3^{4-x^2}$

e. $\left(4-x^2\right)3^{3-x^2}$

18. If $f(x)=\ln x$, then $f\left(\frac{3}{2}\right)=$

a. $\frac{\ln 3}{\ln 2}$

b. $\ln 2-\ln\frac{1}{2}$

c. $\int_{\ln 2}^{\ln 3} e^t dt$

d. $\int_{2}^{3}\ln t\ dt$

e. $\int_{2}^{3}\frac{1}{t}\ dt$

19. $\int_0^1 (x+1)e^{x^2+2x}dx=$

a. $\frac{e^3}{2}$

b. $\frac{e^3-1}{2}$

c. $\frac{e^4-e}{2}$

d. e^3-1

e. e^4-e

20. $\int_0^1 x^3e^{x^4}dx=$

a. $\frac{1}{4}(e-1)$

b. $\frac{1}{4}e$

c. $e-1$

d. e

e. $4(e-1)$

21. $\frac{1}{2}\int e^{\frac{t}{2}}dt =$

a. $e^{-t}+C$

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

c. $e^{\frac{t}{2}}+C$

d. $2e^{\frac{t}{2}}+C$

e. $e^{t}+C$

22. $\int_0^x \sin t\ dt =$

a. $\sin x$

b. $-\cos x$

c. $\cos x$

d. $\cos x-1$

e. $1-\cos x$

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

a. $e-\frac{1}{e}$

b. e^2-e

c. $\frac{e^2}{2}-e+\frac{1}{2}$

d. e^2-2

e. $\frac{e^2}{2}-\frac{3}{2}$

24. $\int_0^{\frac{\pi}{4}} \frac{e^{\tan x}}{\cos^2 x}\ dx =$

a. 0

b. 1

c. $e-1$

d. e

e. $e+1$

25. If the substitution $u=\frac{x}{2}$ is made, the integral

$\int_2^4 \frac{1-\left(\frac{x}{2}\right)^2}{x}\ dx =$

a. $\int_1^2 \frac{1-u^2}{u}du$

b. $\int_2^4 \frac{1-u^2}{u}du$

c. $\int_1^2 \frac{1-u^2}{2u}du$

d. $\int_1^2 \frac{1-u^2}{4u}du$

e. $\int_2^4 \frac{1-u^2}{2u}du$

26. If $\frac{dy}{dx}=\cos(2x)$, then $y=$

a. $-\frac{1}{2}\cos(2x)+C$

b. $-\frac{1}{2}\cos^2(2x)+C$

c. $\frac{1}{2}\sin(2x)+C$

d. $\frac{1}{2}\sin^2(2x)+C$

e. $-\frac{1}{2}\sin(2x)+C$

27. $\int_2^3 \frac{x}{x^2+1}\ dx =$

a. $\frac{1}{2}\ln\frac{3}{2}$

b. $\frac{1}{2}\ln 2$

c. $\ln 2$

d. $2\ln 2$

e. $\frac{1}{2}\ln 5$

Answers

1. d
2. d
3. a
4. c
5. e
6. c
7. d
8. a
9. d
10. b
11. c
12. d
13. c
14. b
15. a
16. d
17. b
18. e
19. b
20. a
21. c
22. e
23. e
24. c
25. a
26. c
27. b