MATHS

NCERT - FULL MARKS MATHS(TAMIL)

INTEGRALS

Examples

1. Write an anti derivative for each of the following functions

(i) $\cos 2x$

(ii) e^{4x}

(iii) $\frac{1}{x}, x \neq 0$

(iv) $3x^2 + 4x^3$

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2. Find the following integrals:

(i) $\int \frac{x^3 - 1}{x^2} dx$ (ii) $\int \left(x^{\frac{2}{3}} + 1 \right) dx$ (iii) $\int \left(x^{\frac{3}{2}} + 2e^x - \frac{1}{x} \right) dx$

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3. Find the following integrals:

(i) $\int (\sin x + \cos x) dx$ (ii) $\int \cos ecx (\cos ecx + \cot x) dx$ (iii) $\int \frac{1 - \sin x}{\cos^2 x} dx$

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4. Find the anti derivative F of f defined by f (x) = $4x^3 - 6$, where F (0) = 3

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5. Integrate the following functions w.r.t. x:

(i) sinmx (ii) $2x\sin\left(x^2+1\right)$ (iii) $\frac{\tan^4\sqrt{x}\sec^2\sqrt{x}}{\sqrt{x}}$ (iv) $\frac{\sin\left(\tan^{-1}x\right)}{1+x^2}$

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6. Find the following integrals:

(i) $\int\sin^3 x\cos^2 x dx$ (ii) $\int\frac{\sin x}{\sin(x+a)}dx$ (iii) $\int\frac{1}{1+\tan x}dx$

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7. Evaluate $\int\frac{x^2+1}{x^2-5x+6}dx$

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8. Find $\int\frac{3x-2}{(x+1)^2(x+3)}dx$

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9. Find $\int \frac{x^2}{(x^2+1)(x^2+4)} dx$

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10. Find $\int \frac{(3\sin\phi - 2)\cos\phi}{5 - \cos^2\phi - 4\sin\phi} d\phi$

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11. Find $\int \frac{x^2 + x + 1dx}{(x+2)(x^2+1)}$

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12. Evaluate: $\int x\cos x dx$

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13. Find $\int e^x \sin x dx$

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14. Evaluate the following integrals

$\int x e^x dx$

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15. Find $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx$

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16. Find $\int e^x \sin x dx$

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17. Find (i) $\int e^x \left(\tan^{-1} x + \frac{1}{1+x^2} \right) dx$ (ii) $\int \frac{(x^2+1)e^x}{(x+1)^2} dx$

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18. Find $\int \sqrt{x^2+2x+5} dx$

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19. Evaluate

$\int \sqrt{3-2x-x^2} dx$

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20. Find $\int_0^2 (x^2+1) dx$ as the limit of a sum

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21. Evaluate $\int_0^2 e^x dx$ as the limit of a sum.

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22. Evaluate $\int_{-1}^{1} 5x^4\sqrt{x^5+1}dx$

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23. Evaluate $\int_0^1 \frac{\tan^{-1}x}{1+x^2}dx$

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24. Evaluate $\int_{-1}^{2} |x^3 - x|dx$

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25. Evaluate the following integrals using properties of integration :

$$\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sin^2 x dx$$

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26. Evaluate $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x} dx$

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27. Evaluate $\int_{-1}^{1} \sin^5 x \cos^4 x dx$

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28. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$

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29. Evaluate $\pi \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{dx}{1+\sqrt{\tan x}}$

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30. Evaluate $\int_0^{\frac{\pi}{2}} \log \sin x dx$

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31. Find $\int \cos 6x \sqrt{1+\sin 6x} dx$

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32. Find $\int \frac{\left(x^4-x\right)^{\frac{1}{4}}}{x^5} dx$

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33. Find $\int[\sqrt{\cot x}+\sqrt{\tan x}]dx$

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34. Find $\int\frac{\sin 2x\cos 2xdx}{\sqrt{9-\cos^4(2x)}}$

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35. Evaluate $\int_{-1}^{\frac{3}{2}}|x\sin(\pi x)|dx$

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36. Evaluate $\int_0^{\pi}\frac{xdx}{a^2\cos^2 x+b^2\sin^2 x}$

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Exercise 7 1

1. Find an anti derivative (or integral) of the following functions by the method of inspection.

sin 2x

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2. Find an anti derivative (or integral) of the following functions by the method of inspection.

cos 3x

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3. Find an anti derivative (or integral) of the following functions by the method of inspection.

e^{2x}

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4. Find an anti derivative (or integral) of the following functions by the method of inspection.

$(ax+b)^2$

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5. Find an anti derivative (or integral) of the following functions by the method of inspection.

$\sin 2x - 4e^{3x}$

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6. Find the following integrals

$$\int (4e^{3x} + 1)\,dx$$

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7. Find the following integrals

$$\int x^2 \left(1 + \frac{1}{x^2}\right) dx$$

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8. Find the following integrals

$$\int (ax^2 + bx + c)\,dx$$

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9. Find the following integrals

$$\int (2x^2 + e^x)\,dx$$

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10. Find the following integrals

$$\int \left(\sqrt{x} - \frac{1}{\sqrt{x}}\right)^2 dx$$

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11. Solve the integrals

$$\int \frac{x^3 + 5x^2 - 4}{x^2}\,dx$$

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12. Find the following integrals

$$\int \frac{x^3 + 3x + 4}{\sqrt{x}} dx$$

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13. Find the following integrals

$$\int \frac{x^3 - x^2 + x - 1}{x - 1} dx$$

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14. Find the following integrals

$$\int (1 - x)\sqrt{x} dx$$

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15. Find the following integrals

$$\int (ax^2 + bx + c)\,dx$$

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16. Find the following integrals

$$\int (2x - 3\cos x + e^x)\,dx$$

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17. Find the following integrals

$$\int (2x^2 - 3\sin x + 5\sqrt{x})\,dx$$

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18. Find the following integrals

$$\int \sec x(\sec x + \tan x)dx$$

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19. Find the following integrals

$$\int \frac{\sec^2 x}{\cos ec^2 x}dx$$

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20. Find the following integrals

$$\int \frac{2 - 3\sin x}{\cos^2 x}dx$$

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21. Choose the correct answer

The anti derivative of $\left(\sqrt{x}+\frac{1}{\sqrt{x}}\right)$ equals

A. $\frac{1}{3}x^{\frac{1}{3}}+2x^{\frac{1}{2}}+C$

B. $\frac{2}{3}x^{\frac{1}{3}}+\frac{1}{2}x^{2}+C$

C. $\frac{2}{3}x^{\frac{3}{2}}+2x^{\frac{1}{2}}+C$

D. $\frac{3}{2}x^{\frac{3}{2}}+\frac{1}{2}x^{\frac{1}{2}}+C$

Answer: C

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22. Choose the correct answer

If $\frac{d}{dx}f(x)=4x^{3}-\frac{3}{x^{4}}$ such that f (2) = 0. Then f (x) is

A. $x^{4}+\frac{1}{x^{3}}-\frac{129}{8}$

B. $x^3 + \frac{1}{x^4} + \frac{129}{8}$

C. $x^4 + \frac{1}{x^3} + \frac{129}{8}$

D. $x^3 + \frac{1}{x^4} - \frac{129}{8}$

Answer: A

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Exercise 7 2

1. Integrate the functions

$$\frac{2x}{1 + x^2}$$

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2. Integrate the functions

$$\frac{(\log x)^2}{x}$$

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3. Integrate the functions

$$\frac{1}{x + x \log x}$$

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4. Integrate the functions

$$\sin x \sin(\cos x)$$

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5. Integrate the functions

$\sin(ax+b)\cos(ax+b)$

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6. Integrate the functions

$\sqrt{ax+b}$

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7. Integrate the functions

$x\sqrt{x+2}$

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8. Integrate the functions

$x\sqrt{1+2x^2}$

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9. Integrate the functions

$(4x+2)\sqrt{x^2+x+1}$

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10. Integrate the functions

$$\frac{1}{x-\sqrt{x}}$$

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11. Integrate the functions

$$\frac{x}{\sqrt{x+4}}, x > 0$$

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12. Integrate the functions

$$\left(x^3 - 1\right)^{\frac{1}{3}} x^5$$

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13. Integrate the functions

$$\frac{x^2}{\left(2 + 3x^3\right)^3}$$

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14. Integrate the functions

$$\frac{1}{x(\log x)^m}, x > 0, m \neq 1$$

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15. Integrate the functions

$$\frac{x}{9 - 4x^2}$$

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16. Integrate the functions

$$e^{2x+3}$$

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17. Integrate the functions

$$\frac{x}{e^{x^2}}$$

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18. Integrate the functions

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

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19. Integrate the functions

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

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20. Integrate the functions

$$\frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}}$$

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21. Integrate the functions

$$\tan^2(2x - 3)$$

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22. Integrate the functions

$$\sec^2(7 - 4x)$$

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23. Integrate the functions

$$\frac{\sin^{-1} x}{\sqrt{1-x^2}}$$

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24. Integrate the functions

$$\frac{2\cos x - 3\sin x}{6\cos x + 4\sin x}$$

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25. Integrate the functions

$$\frac{1}{\cos^2 x(1-\tan x)^2}$$

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26. Integrate the functions

$$\frac{\cos\sqrt{x}}{\sqrt{x}}$$

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27. Integrate the functions

$$\sqrt{\sin 2x}\cos 2x$$

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28. Integrate the functions

$$\frac{\cos x}{\sqrt{1+\sin x}}$$

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29. Integrate the functions

cot x log sin x

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30. Integrate the functions

$$\frac{\sin x}{1+\cos x}$$

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31. Integrate the functions

$$\frac{\sin x}{(1+\cos x)^2}$$

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32. Integrate the functions

$$\frac{1}{1+\cot x}$$

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33. Integrate the functions

$$\frac{1}{1-\tan x}$$

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34. Integrate the functions

$$\frac{\sqrt{\tan x}}{\sin x \cos x}$$

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35. Integrate the functions

$$\frac{(1+\log x)^2}{x}$$

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36. Integrate the functions

$$\frac{(x+1)(x+\log x)^2}{x}$$

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37. Integrate $\frac{x^3 \sin\left(\tan^{-1} x^4\right)}{1+x^8}$

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38. $\frac{10x^9 + 10^x \log, 10}{10^x + x^{10}}$

A. $10^x - x^{10} + C$

B. $10^x + x^{10} + C$

C. $\left(10^x - x^{10}\right)^{-1} + C$

D. $\log\left(10^x + x^{10}\right) + C$

Answer: D

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39. Answer the equation:

$$\int \frac{dx}{\sin^2 x \cos^2 x}$$

A. tan x + cot x + C

B. tan x – cot x + C

C. tan x cot x + C

D. tan x – cot 2x + C

Answer: B

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Exercise 7 3

1. Find the integrals of the functions

$\sin^2(2x + 5)$

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2. Find the integrals of the functions

$\sin 3x \cos 4x$

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3. Find the integrals of the functions

cos 2x cos 4x cos 6x

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4. Find the integrals of the functions

$\sin^3(2x+1)$

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5. Find the integrals of the functions

$\sin^3 x \cos^3 x$

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6. Find the integrals of the functions

sin x sin 2x sin 3x

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7. Find the integrals of the functions

sin 4x sin 8x

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8. Find the integrals of the functions

$$\frac{1-\cos x}{1+\cos x}$$

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9. Find the integrals of the functions

$$\frac{\cos x}{1+\cos x}$$

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10. Find the integrals of the functions

$$\sin^4 x$$

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11. Find the integrals of the functions

$$\cos^4 2x$$

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12. Find the imtegrals of the functions

$$\frac{\sin^2 x}{1+\cos x}$$

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13. Find the imtegrals of the functions

$$\frac{\cos 2x - \cos 2\alpha}{\cos x - \cos \alpha}$$

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14. Find the imtegrals of the functions

$$\frac{\cos x - \sin x}{1+\sin 2x}$$

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15. Find the integrals of the functions

$\tan^3 2x \sec^2 2x$

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16. Find the imtegrals of the functions

$\tan^4 x$

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17. Find the imtegrals of the functions

$$\frac{\sin^3 x + \cos^3 x}{\sin^2 x \cos^2 x}$$

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18. Find the imtegrals of the functions

$$\frac{\cos 2x + 2\sin^2 x}{\cos^2 x}$$

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19. Find the integrals of the functions

$$\frac{1}{\sin x \cos^3 x}$$

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20. Find the integrals of the functions

$$\frac{\cos 2x}{(\cos x + \sin x)^2}$$

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21. Find the imtegrals of the functions

$\sin^{-1}(\cos x)$

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22. Find the integrals of the functions

$$\frac{1}{\cos(x-a)\cos(x-b)}$$

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23. $\int \frac{\sin^2 x + \cos^2 x}{\sin^2 x \cos^2 x} dx$ is equal to

A. tan x + cot x + C

B. tan x + cosec x + C

C. $-\tan x + \cot x + C$

D. tan x + sec x + C

Answer: A

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24. $\int \frac{e^x(1+x)}{\cos^2(e^x x)} dx$ equals

A. $-\cot(ex^x) + C$

B. $\tan(xe^x) + C$

C. $\tan(e^x) + C$

D. $\cot(e^x) + C$

Answer: B

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Exercise 7 4

1. Integrate the function

$$\frac{3x^2}{x^6+1}$$

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2. Integrate the function

$$\frac{1}{\sqrt{1+4x^2}}$$

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3. Integrate the function

$$\frac{1}{\sqrt{(2-x)^2+1}}$$

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4. Integrate the function

$$\frac{1}{\sqrt{9-25x^2}}$$

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5. Integrate the functions

$$\frac{3x}{1+2x^4}$$

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6. Integrate the functions

$$\frac{x^2}{1-x^6}$$

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7. Integrate the function

$$\frac{x-1}{\sqrt{x^2-1}}$$

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8. Integrate the function

$$\frac{x^2}{\sqrt{x^6+a^6}}$$

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9. Integrate the function

$$\frac{\sec^2 x}{\sqrt{\tan^2 x+4}}$$

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10. Integrate the function

$$\frac{1}{\sqrt{x^2+2x+2}}$$

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11. Integrate the function

$$\frac{1}{9x^2+6x+5}$$

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12. Integrate the function

$$\frac{1}{\sqrt{7-6x-x^2}}$$

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13. Integrate the function

$$\frac{1}{\sqrt{(x-1)(x-2)}}$$

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14. Integrate the function

$$\frac{1}{\sqrt{8+3x-x^2}}$$

Watch Video Solution

15. Integrate the function

$$\frac{1}{\sqrt{(x-a)(x-b)}}$$

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16. Integrate the function

$$\frac{4x+1}{\sqrt{2x^2+x-3}}$$

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17. Integrate the function

$$\frac{x+2}{\sqrt{x^2-1}}$$

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18. Integrate the functions

$$\frac{6x+2}{1+2x+3x^2}$$

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19. Integrate the function

$$\frac{6x+7}{\sqrt{(x-5)(x-4)}}$$

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20. Integrate the function

$$\frac{x+2}{\sqrt{4x-x^2}}$$

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21. Integrate the function

$$\frac{x+2}{\sqrt{x^2+2x+3}}$$

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22. Integrate the functions

$$\frac{x+3}{x^2-2x-5}$$

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23. Integrate the function

$$\frac{5x+3}{\sqrt{x^2+4x+10}}$$

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24. Choose the correct answer

$\int \frac{dx}{x^2+2x+2}$ equals

A. $x\tan^{-1}(x+1)+C$

B. $\tan^{-1}(x+1)+C$

C. $(x+1)\tan^{-1}x+C$

D. $\tan^{-1} x + C$

Answer: B

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25. Choose the correct answer

$\int \frac{dx}{\sqrt{9x - 4x^2}}$ equals

A. $\frac{1}{9}\sin^{-1}\left(\frac{9x - 8}{8}\right) + C$

B. $\frac{1}{2}\sin^{-1}\left(\frac{8x - 9}{9}\right) + C$

C. $\frac{1}{3}\sin^{-1}\left(\frac{9x - 8}{8}\right) + C$

D. $\frac{1}{2}\sin^{-1}\left(\frac{9x - 8}{9}\right) + C$

Answer: B

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Exercise 7 5

1. Integrate the rational functions

$$\frac{x}{(x+1)(x+2)}$$

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2. Integrate the rational functions

$$\frac{1}{x^2-9}$$

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3. Integrate the rational functions

$$\frac{3x-1}{(x-1)(x-2)(x-3)}$$

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4. Integrate the rational functions

$$\frac{x}{(x-1)(x-2)(x-3)}$$

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5. Integrate the rational functions

$$\frac{2x}{x^2+3x+2}$$

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6. Integrate the rational functions

$$\frac{1-x^2}{x(1-2x)}$$

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7. Integrate the rational functions

$$\frac{x}{(x^2+1)(x-1)}$$

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8. Integrate the rational functions

$$\frac{x}{(x-1)^2(x+2)}$$

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9. Integrate the rational functions

$$\frac{3x+5}{x^3-x^2-x+1}$$

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10. Integrate the rational functions

$$\frac{2x-3}{(x^2-1)(2x+3)}$$

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11. Integrate the rational functions

$$\frac{5x}{(x+1)(x^2-4)}$$

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12. Integrate the rational functions

$$\frac{x^3+x+1}{x^2-1}$$

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13. Integrate the rational functions

$$\frac{2}{(1-x)(1+x^2)}$$

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14. Integrate the rational functions

$$\frac{3x-1}{(x+2)^2}$$

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15. Integrate the rational functions

$$\frac{1}{x^4-1}$$

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16. Integrate the rational functions

$$\frac{1}{x(x^n+1)}$$

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17. $\frac{\cos x}{(1-\sin x)(2-\sin x)}$ [Hint : Put sin x = t]

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18. Integrate the rational functions

$$\frac{(x^2+1)(x^2+2)}{(x^2+3)(x^2+4)}$$

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19. Integrate the rational functions

$$\frac{2x}{(x^2+1)(x^2+3)}$$

Watch Video Solution

20. Integrate the rational functions

$$\frac{1}{x(x^4-1)}$$

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21. Integrate the rational functions

$$\frac{1}{(e^x-1)}$$ [Hint : Put e^x = t]

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22. Choose the correct answer

$$\int \frac{xdx}{(x-1)(x-2)}$$ equals

A. $\log\left|\frac{(x-1)^2}{x-2}\right| + C$

B. $\log\left|\frac{(x-2)^2}{x-1}\right|+C$

C. $\log\left|\left(\frac{x-1}{x-2}\right)^2\right|+C$

D. $\log|(x-1)(x-2)|+C$

Answer: B

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23. Choose the correct answer

$\int\frac{dx}{x(x^2+1)}$ equals

A. $\log|x|-\frac{1}{2}\log\left(x^2+1\right)+C$

B. $\log|x|+\frac{1}{2}\log\left(x^2+1\right)+C$

C. $-\log|x|+\frac{1}{2}\log\left(x^2+1\right)+C$

D. $\frac{1}{2}\log|x|+\log\left(x^2+1\right)+C$

Answer: A

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Exercise 7 6

1. Integrate the functions

$x \sin x$

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2. Integrate the function

$x \sin 3x$

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3. Integrate the functions

$x^2 e^X$

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4. Integrate the function

$x \log x$

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5. Integrate the functions

$x \log 2x$

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6. Integrate the functions

$x^2 \log x$

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7. Integrate the functions

$x \sin^{-1} x$

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8. Integrate the functions

$x \tan^{-1} x$

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9. Integrate the function

$x \cos^{-1} x$

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10. Integrate the function

$\left(\sin^{-1} x\right)^2$

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11. Integrate the functions

$$\frac{x \cos^{-1} x}{\sqrt{1-x^2}}$$

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12. Integrate the function

$$x \sec^2 x$$

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13. Integrate the functions

$$\tan^{-1} x$$

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14. Integrate the functions

$x(\log x)^2$

Watch Video Solution

15. Integrate the functions

$\left(x^2+1\right)\log x$

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16. Integrate the functions

$e^x(\sin x+\cos x)dx$

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17. Integrate the functions

$$\frac{xe^x}{(1+x)^2}$$

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18. Integrate the functions

$$e^x\left(\frac{1+\sin x}{1+\cos x}\right)$$

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19. Integrate the functions

$$e^x\left(\frac{1}{x}-\frac{1}{x^2}\right)$$

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20. Integrate the functions

$$\frac{(x-3)e^x}{(x-1)^3}$$

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21. Integrate the functions

$e^{2x}\sin x$

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22. $\sin^{-1}\left(\frac{2x}{1+x^2}\right)$

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23. $\int x^2 e^{x^3} dx$ equals

A. $\frac{1}{3}e^{x^3}+C$

B. $\frac{1}{3}e^{x^2}+C$

C. $\frac{1}{2}e^{x^3}+C$

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

Answer: A

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24. Evaluate $\int e^x \sec x(1+\tan x)dx.$

A. $e^x \cos x + C$

B. $e^x \sec x + C$

C. $e^x \sin x + C$

D. $e^x \tan x + C$

Answer: B

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Exercise 7 7

1. Integrate the functions

$\sqrt{4-x^2}$

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2. Integrate the functions

$\sqrt{1-4x^2}$

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3. Integrate the functions

$\sqrt{x^2+4x+6}$

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4. Integrate the functions

$\sqrt{x^2 + 4x + 1}$

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5. Integrate the functions

$\sqrt{1 - 4x - x^2}$

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6. Integrate the functions

$\sqrt{x^2 + 4x - 5}$

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7. Integrate the functions

$\sqrt{1+3x-x^2}$

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8. Integrate the functions

$\sqrt{x^2+3x}$

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9. Integrate the functions

$\sqrt{1+\frac{x^2}{9}}$

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10. $\int\sqrt{1+x^2}$ dx is equal to

A. $\frac{x}{2}\sqrt{1+x^2}+\frac{1}{2}\log\left|\left(x+\sqrt{1+x^2}\right)\right|+C$

B. $\frac{2}{3}\left(1+x^2\right)^{\frac{3}{2}}+C$

C. $\frac{2}{3}x\left(1+x^2\right)^{\frac{3}{2}}+C$

D. $\frac{x^2}{2}\sqrt{1+x^2}+\frac{1}{2}x^2\log\left|x+\sqrt{1+x^2}\right|+C$

Answer: A

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11. Choose the correct answer

$\int\sqrt{x^2-8x+7}\,dx$ is equal to

A.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7}+9\log\left|x-4+\sqrt{x^2-8x+7}\right|+C$$

B.

$$\frac{1}{2}(x+4)\sqrt{x^2-8x+7}+9\log\left|x+4+\sqrt{x^2-8x+7}\right|+C$$

C.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7}-3\sqrt{2}\log\left|x-4+\sqrt{x^2-8x+7}\right|+C$$

D.

$$\frac{1}{2}(x-4)\sqrt{x^2-8x+7}-\frac{9}{2}\log\left|x-4+\sqrt{x^2-8x+7}\right|+C$$

Answer: D

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Exercise 7 8

1. Evaluate the following definite integrals as limit of sums.

$$\int_a^b x\,dx$$

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2. Evaluate the following definite integrals as limit of sums.

$$\int_0^5 (x+1)dx$$

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3. Evaluate the following definite integrals as limit of sums.

$$\int_2^3 x^2 dx$$

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4. Evaluate the following definite integrals as limit of sums.

$$\int_1^4 (x^2 - x)dx$$

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5. Evaluate the following definite integrals as limit of sums.

$$\int_{-1}^{1} e^x dx$$

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6. Evaluate the following definite integrals as limit of sums.

$$\int_{0}^{4} \left(x + e^{3x}\right) dx$$

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Exercise 7 9

1. Evaluate the definite integrals

$$\int_{-1}^{1} (x + 1) dx$$

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2. Evaluate the definite integrals

$$\int_2^3 \frac{1}{x} dx$$

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3. Evaluate the definite integrals

$$\int_1^2 \left(4x^3 - 5x^2 + 6x + 9\right) dx$$

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4. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{4}} \sin 2x dx$$

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5. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{2}} \cos 2x\, dx$$

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6. Evaluate the definite integrals

$$\int_4^5 e^x\, dx$$

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7. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{4}} \tan x\, dx$$

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8. Evaluate the definite integrals

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \operatorname{cosec} x \, dx$$

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9. Evaluate the definite integrals

$$\int_0^1 \frac{dx}{\sqrt{1+x^2}}$$

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10. Evaluate the definite integrals

$$\int_0^1 \frac{dx}{\sqrt{1+x^2}}$$

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11. Evaluate the definite integrals

$$\int_2^3 \frac{dx}{x^2-1}$$

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12. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{2}} \cos^2 x dx$$

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13. Evaluate the definite integrals

$$\int_2^3 \frac{xdx}{x^2+1}$$

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14. Evaluate the definite integrals

$$\int_0^1 \frac{2x+3}{5x^2+1}dx$$

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15. Evaluate the definite integrals

$$\int_0^1 xe^{x^2}dx$$

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16. Evaluate the definite integrals

$$\int_1^2 \frac{5x^2}{x^2+4x+3}$$

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17. Evaluate the definite integral

$$\int_0^{\frac{\pi}{4}} \left(2\sec^2 x + x^3 + 2\right) dx$$

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18. Evaluate the definite integrals

$$\int_0^{\pi} \left(\frac{\sin^2 x}{2} - \frac{\cos^2 x}{2}\right) dx$$

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19. Evaluate the definite integrals

$$\int_0^1 \frac{2x+3}{5x^2+1} dx$$

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20. Evaluate the definite integral

$$\int_0^1 \left(xe^x + \sin\frac{\pi x}{4}\right)dx$$

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21. $\int_1^{\sqrt{3}} \frac{dx}{1+x^2} is$

A. $\frac{\pi}{3}$

B. $\frac{2\pi}{3}$

C. $\frac{\pi}{6}$

D. $\frac{\pi}{12}$

Answer: D

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22. Choose the correct answer

$\int_0^{\frac{2}{3}} \frac{dx}{4+9x^2}$ equals

A. $\frac{\pi}{6}$

B. $\frac{\pi}{12}$

C. $\frac{\pi}{24}$

D. $\frac{\pi}{4}$

Answer: C

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Exercise 7 10

1. Evaluate the integrals by using substitution

$\int_0^1 \frac{x}{x^2+1} dx$

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2. Evaluate the integrals by using substitution

$$\int_0^{\frac{\pi}{2}} \sqrt{\sin\phi}\cos^5\phi d\phi$$

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3. Evaluate the integrals by using substitution

$$\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right)dx$$

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4. Evaluate the integrals by using substitution

$$\int_0^2 x\sqrt{x+2}$$ (Put x + 2 = t^2)

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5. Evaluate the integrals by using substitution

$$\int_0^{\frac{\pi}{2}} \frac{\sin x}{1+\cos^2 x} dx$$

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6. Evaluate the integrals by using substitution

$$\int_0^2 \frac{dx}{x+4-x^2}$$

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7. Evaluate the integrals by using substitution

$$\int_{-1}^1 \frac{dx}{x^2+2x+5}$$

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8. Evaluate the integrals by using substitution

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

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9. Choose the correct answer

The value of the integral $\int_{\frac{1}{3}}^{1} \frac{\left(x - x^3\right)^{\frac{1}{3}}}{x^4} dx$ is

A. 6

B. 0

C. 3

D. 4

Answer: A

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10. If $f(x) = \int_0^x t \sin t dt$, then $f'(x) = \ldots\ldots$

A. cosx + x sin x

B. x sinx

C. x cosx

D. sinx + x cosx

Answer: B

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Exercise 7 11

1. By using the properties of definite integrals, evaluate the integrals

$\int_0^{\frac{\pi}{2}} \cos^2 x dx$

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2. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$$

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3. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{5}{2}} x dx}{\sin^{\frac{5}{2}} x+\cos^{\frac{5}{2}} x}$$

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4. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} \frac{\cos^5 x dx}{\sin^5 x+\cos^5 x}$$

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5. By using the properties of definite integrals, evaluate the integrals

$$\int_{-5}^{5} |x+2| dx$$

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6. evaluate the integrals

$$\int_{2}^{8} |x-5| dx$$

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7. Evaluate $\int_{0}^{1} x(1-x)^n dx$

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8. By using the properties of definite integrals, evaluate the integrals

$$\int_{0}^{\frac{\pi}{4}} \log(1+\tan x) dx$$

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9. By using the properties of definite integrals, evaluate the integrals

$$\int_0^2 x\sqrt{2-x}dx$$

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10. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} (2\log\sin x - \log\sin 2x)dx$$

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11. By using the properties of definite integrals, evaluate the integrals

$$\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \sin^2 x dx$$

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12. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\pi} \frac{x dx}{1+\sin x}$$

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13. By using the properties of definite integrals, evaluate the integrals

$$\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \sin^7 x dx$$

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14. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{2\pi} \cos^5 x dx$$

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15. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$$

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16. By using the properties of definite integrals, evaluate the integrals

$$\int_0^{\pi} \log(1 + \cos x) dx$$

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17. By using the properties of definite integrals, evaluate the integrals

$$\int_0^a \frac{\sqrt{x}}{\sqrt{x}+\sqrt{a-x}}dx$$

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18. By using the properties of definite integrals, evaluate the integrals

$$\int_0^4 |x-1|dx$$

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19. By using the properties of definite integrals, evaluate the integrals

Show that $\int_0^a f(x)g(x)dx = 2\int_0^a f(x)dx$, if f and g are defined as $f(x) = f(a-x)$ and $g(x) + g(a-x) = 4$.

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20. The value of $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \left(x^3 + x\cos x + \tan^5 x + 1\right) dx$ is

A. 0

B. 2

C. π

D. 1

Answer: C

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21. The value $\int_0^{\frac{\pi}{2}} \log\left(\frac{4 + 3\sin x}{4 + 3\cos x}\right) dx$ is

A. 2

B. $\frac{3}{4}$

C. 0

D. -2

Answer: C

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Exercise 7 12

1. Integrate the functions

$$\frac{1}{x - x^3}$$

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2. Integrate the functions

$$\frac{1}{\sqrt{x+a} + \sqrt{x+b}}$$

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3. Integrate the functions

$$\frac{1}{x\sqrt{ax - x^2}}$$ [Hint: Put x = $\frac{a}{t}$]

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4. Integrate the functions

$$\frac{1}{x^2(x^4 + 1)^{\frac{3}{4}}}$$

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5. Evaluate $\int \frac{1}{x^{\frac{1}{2}} + x^{\frac{1}{3}}} dx$

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6. Integrate the functions

$$\frac{5x}{(x+1)(x^2+9)}$$

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7. Integrate the functions

$$\frac{\sin x}{\sin(x-a)}$$

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8. Integrate the functions

$$\frac{e^{5\log X} - e^{4\log X}}{e^{3\log X} - e^{2\log X}}$$

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9. Integrate the functions

$$\frac{\cos x}{\sqrt{4-\sin^2 x}}$$

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10. $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x} dx$ is

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11. Integrate the functions

$$\frac{1}{\cos(x+a)\cos(x+b)}$$

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12. Integrate the functions

$$\frac{x^3}{\sqrt{1-x^8}}$$

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13. Integrate the functions

$$\frac{e^x}{(1+e^x)(2+e^x)}$$

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14. Integrate the functions

$$\frac{1}{(x^2+1)(x^2+4)}$$

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15. Integrate the functions

$$\cos^3 x e^{\log \sin x}$$

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16. Integrate the functions

$$e^{3\log x}\left(x^4+1\right)^{-1}$$

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17. Integrate the functions

$$f'(ax+b)[f(ax+b)]^n$$

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18. Integrate the functions

$$\frac{1}{\sqrt{\sin^3 x \sin(x+\alpha)}}$$

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19. Integrate the functions

$$\frac{\sin^{-1}\sqrt{x}-\cos^{-1}\sqrt{x}}{\sin^{-1}\sqrt{x}+\cos^{-1}\sqrt{x}}, x \in [0,1]$$

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20. Integrate the functions

$$\sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}}$$

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21. Integrate the functions

$$\frac{2+\sin 2x}{1+\cos 2x}e^{x}$$

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22. Integrate the functions

$$\frac{x^2+x+1}{(x+1)^2(x+2)}$$

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23. Integrate the functions

$$\tan^{-1} x$$

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24. Integrate the functions

$$\frac{\sqrt{x^2+1}\left[\log\left(x^2+1\right)-2\log x\right]}{x^4}$$

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25. Evaluate the definite integrals

$$\int_{\frac{\pi}{2}}^{\pi} e^x \left(\frac{1 - \sin x}{1 - \cos x} \right) dx$$

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26. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{4}} \frac{\sin x \cos x}{\cos^4 x + \sin^4 x} dx$$

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27. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{2}} \frac{\cos^2 x dx}{\cos^2 x + 4 \sin^2 x}$$

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28. Evaluate the definite integrals

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx.$$

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29. Evaluate the definite integrals

$$\int_0^1 \frac{dx}{\sqrt{1+x} - \sqrt{x}}$$

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30. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$$

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31. Evaluate the definite integrals

$$\int_0^{\frac{\pi}{2}} \sin 2x \tan^{-1}(\sin x) dx$$

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32. Evaluate the definite integrals

$$\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$$

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33. Evaluate the definite integrals

$$\int_1^4 [|x-1| + |x-2| + |x-3|] dx$$

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34. Prove the following

$$\int_1^3 \frac{dx}{x^2(x+1)} = \frac{2}{3} + \log\frac{2}{3}$$

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35. Prove the following

$$\int_0^1 xe^x dx = 1$$

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36. Prove the following

$$\int_{-1}^1 x^{17}\cos^4 x dx = 0$$

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37. Prove the following

$$\int_0^{\frac{\pi}{2}} \sin^3 x dx = \frac{2}{3}$$

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38. Prove the following

$$\int_0^{\frac{\pi}{4}} 2\tan^3 x dx = 1 - \log 2$$

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39. Prove the following

$$\int_0^1 \sin^{-1} x dx = \frac{\pi}{2} - 1$$

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40. Evaluate $\int_0^1 e^{2-3x} dx$ as a limit of a sum.

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41. $\int \frac{dx}{e^x + e^{-x}}$ is equal to

A. $\tan^{-1}(e^x) + C$

B. $\tan^{-1}(e^{-x}) + C$

C. $\log(e^x - e^{-x}) + C$

D. $\log(e^x + e^{-x}) + C$

Answer: A

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42. Choose the correct answers

$\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$ is equal to

A. $\frac{-1}{\sin x + \cos x} + C$

B. $\log|\sin x + \cos x| + C$

C. $\log|\sin x - \cos x| + C$

D. $\frac{1}{(\sin x + \cos x)^2}$

Answer: B

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43. Choose the correct answers

If f (a + b - x) = f (x), then $\int_a^b x f(x)\, dx$ is equal to

A. $\frac{a+b}{2}\int_a^b f(b-x)dx$

B. $\frac{a+b}{2}\int_a^b f(b+x)dx$

C. $\frac{b-a}{2}\int_a^b f(x)dx$

D. $\frac{a+b}{2}\int_a^b f(x)dx$

Answer: D

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44. Choose the correct answers

The value of $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$ is

A. 1

B. 0

C. -1

D. $\frac{\pi}{4}$

Answer: B

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