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INTEGRATION BASICS

(WITHOUT ANSWERS)

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Question 1

Integrate:

1. $\int (3x+1)^2 \, dx$

2. $\int 4(2x+1)^5 \, dx$

3. $\int \frac{6}{(2x-1)^2} \, dx$

4. $\int 6(4x-3)^{\frac{1}{2}} \, dx$

5. $\int \frac{6}{\sqrt{3x+1}} \, dx$

6. $\int 10(1-4x)^{\frac{3}{2}} \, dx$

7. $\int 20(1-3x)^4 \, dx$

8. $\int \sqrt[3]{8x-1} \, dx$

9. $\int \frac{60}{(1-4x)^{\frac{7}{2}}} dx$

10. $\int 12\left(3-\frac{1}{2}x\right)^{\frac{1}{2}} \, dx$

Question 2

Integrate:

1. $\int (5x+1)^3 \, dx$

2. $\int 3(4x+1)^3 \, dx$

3. $\int \frac{4}{(3x-1)^2} \, dx$

4. $\int 18(3x-2)^{\frac{1}{2}} \, dx$

5. $\int \frac{12}{\sqrt{4x+1}} \, dx$

6. $\int 15(1-2x)^{\frac{3}{2}} \, dx$

7. $\int 15(1-6x)^3 \, dx$

8. $\int \sqrt[3]{6x-1} \, dx$

9. $\int \frac{30}{(1-2x)^{\frac{9}{2}}} dx$

10. $\int 30\left(1-\frac{1}{3}x\right)^{\frac{3}{2}} \, dx$

Question 3

Integrate:

1. $\int (5x+1)^6 \, dx$

2. $\int 3(3x+1)^4 \, dx$

3. $\int \frac{12}{(6x-1)^3} \, dx$

4. $\int 15(2x-3)^{\frac{3}{2}} \, dx$

5. $\int \frac{2}{\sqrt{8x+3}} \, dx$

6. $\int \frac{27}{2}(1-2x)^{\frac{7}{2}} \, dx$

7. $\int 15(1-5x)^7 \, dx$

8. $\int \sqrt[3]{2x-1} \, dx$

9. $\int \frac{100}{(2-5x)^{\frac{7}{2}}} dx$

10. $\int 15\sqrt[4]{1-\frac{1}{4}x} \, dx$

Question 4

Integrate:

1. $\int (4x+1)^3 \, dx$

2. $\int 2(3x+1)^4 \, dx$

3. $\int \frac{6}{(3x+1)^3} \, dx$

4. $\int 4(3x-2)^{\frac{1}{2}} \, dx$

5. $\int \frac{9}{\sqrt{6x+3}} \, dx$

6. $\int 15(2-3x)^{\frac{3}{2}} \, dx$

7. $\int 40(3-2x)^5 \, dx$

8. $\int \sqrt[3]{4x-3} \, dx$

9. $\int \frac{30}{(1-3x)^{\frac{7}{2}}} dx$

10. $\int \frac{3}{4}\left(3-\frac{5x}{3}\right)^{\frac{1}{2}} dx$

Question 5

Integrate:

1. $\int 10\sin 2x \, dx$

2. $\int 4\cos 3x \, dx$

3. $\int 8\sin x - 5\cos x \, dx$

4. $\int 3\cos x - 2\sin x \, dx$

5. $\int 6\cos 2x - 6\sin 3x \, dx$

6. $\int \sin 2x - \cos 4x \, dx$

7. $\int \cos \frac{1}{2}x + \sin \frac{1}{3}x \, dx$

8. $\int 3\cos 4x - 4\cos 3x \, dx$

9. $\int 6\sin 4x - 4\sin 6x \, dx$

10. $\int 2\cos 2x - \sin \frac{x}{2} + 6\sin \frac{2x}{3} \, dx$

Question 6

Integrate:

1. $\int 4\sin 2x \, dx$

2. $\int 6\cos 2x \, dx$

3. $\int 7\sin x - 2\cos x \, dx$

4. $\int 8\cos x - 5\sin x \, dx$

5. $\int 8\cos 2x - 12\sin 3x \, dx$

6. $\int \sin 3x - \cos 6x \, dx$

7. $\int \cos \frac{1}{4}x + \sin \frac{1}{2}x \, dx$

8. $\int 5\cos 2x - 2\cos 5x \, dx$

9. $\int 3\sin 2x - 2\sin 3x \, dx$

10. $\int 4\cos 2x - \frac{1}{2}\sin \frac{x}{4} + 9\sin \frac{3x}{2} \, dx$

Question 7

Integrate:

1. $\int 5\sin 2x \, dx$

2. $\int 3\cos 6x \, dx$

3. $\int 5\sin x - 4\cos 2x \, dx$

4. $\int 5\cos 2x - 3\sin 5x \, dx$

5. $\int 15\cos 3x - 15\sin 5x \, dx$

6. $\int \sin 8x - \frac{1}{2}\cos 3x \, dx$

7. $\int 2\cos \frac{1}{3}x + 3\sin \frac{1}{2}x \, dx$

8. $\int 7\cos 3x - 3\cos 7x \, dx$

9. $\int \frac{1}{2}\sin 5x - \frac{1}{2}\sin \frac{1}{4}x \, dx$

10. $\int 10\cos 2x - \sin \frac{x}{4} + 9\sin \frac{3x}{2} \, dx$

Question 8

Integrate:

1. $\int e^{x}+e^{2x}+e^{-x}\,dx$

2. $\int 4e^{2x}-e^{-2x}+3e^{3x}\,dx$

3. $\int 2e^{4x}-e^{-3x}+\frac{1}{2}e^{2x}\,dx$

4. $\int 4e^{-2x}-2e^{-4x}+\frac{1}{2}e^{3x}\,dx$

5. $\int 5e^{\frac{1}{2}x}-\frac{1}{2}e^{-\frac{1}{2}x}+\frac{3}{4}e^{\frac{1}{4}x}\,dx$

6. $\int \frac{1}{x+1}+\frac{1}{2x-1}+\frac{1}{2-x}dx$

7. $\int \frac{4}{2x+1}+\frac{2}{2x-1}+\frac{1}{1-3x}dx$

8. $\int \frac{6}{2x-1}+\frac{4}{3x-1}-\frac{2}{1-4x}+\frac{1}{2x}dx$

9. $\int \frac{2}{3x-2}+\frac{2}{5x-1}-\frac{2}{(1-x)^{2}}+\frac{4}{3x}dx$

10. $\int \frac{4}{2x-3}-\frac{2}{1-2x}-\frac{12}{(1+2x)^{3}}+\frac{1}{\frac{1}{2}x}dx$

Question 9

Integrate:

1. $\int \mathrm{e}^{x}+\mathrm{e}^{2x}+\mathrm{e}^{3x}\,dx$

2. $\int 6\mathrm{e}^{2x}+\mathrm{e}^{-2x}-3\mathrm{e}^{-x}\,dx$

3. $\int 3\mathrm{e}^{2x}-2\mathrm{e}^{-2x}+\frac{1}{2}\mathrm{e}^{4x}\,dx$

4. $\int 6\mathrm{e}^{-3x}-2\mathrm{e}^{-2x}+\frac{1}{3}\mathrm{e}^{2x}\,dx$

5. $\int 3\mathrm{e}^{\frac{1}{2}x}-\frac{1}{2}\mathrm{e}^{-\frac{1}{4}x}+3\mathrm{e}^{\frac{3}{2}x}\,dx$

6. $\int \frac{1}{x+2}+\frac{1}{3x-1}+\frac{1}{1-x}\,dx$

7. $\int \frac{6}{3x+1}+\frac{4}{2x-1}+\frac{1}{1-4x}\,dx$

8. $\int \frac{8}{4x-1}+\frac{5}{2x-1}-\frac{2}{1-3x}+\frac{4}{x}\,dx$

9. $\int \frac{9}{3x-1}+\frac{2}{6x-1}-\frac{2}{(1-2x)^{2}}+\frac{1}{2x}\,dx$

10. $\int \frac{3}{5x-3}-\frac{2}{x^{2}}-\frac{12}{(1+3x)^{3}}+\frac{9}{2x}\,dx$

Question 10

Integrate:

1. $\int 2\mathrm{e}^{x}+2\mathrm{e}^{2x}+3\mathrm{e}^{-x}\,dx$

2. $\int 8\mathrm{e}^{2x}-3\mathrm{e}^{-2x}+5\mathrm{e}^{3x}\,dx$

3. $\int \frac{1}{2}\mathrm{e}^{4x}-\mathrm{e}^{-4x}+2\mathrm{e}^{\frac{1}{2}x}\,dx$

4. $\int 2\mathrm{e}^{-3x+1}-3\mathrm{e}^{1-x}+\frac{1}{3}\mathrm{e}^{3x}\,dx$

5. $\int 2\mathrm{e}^{1-\frac{1}{2}x}-\frac{1}{3}\mathrm{e}^{-\frac{1}{6}x}+\frac{3}{2}\mathrm{e}^{\frac{1}{2}x}\,dx$

6. $\int \frac{1}{4x+1}+\frac{3}{3x-1}+\frac{4}{1-x}\,dx$

7. $\int \frac{6}{3x+1}+\frac{3}{3x-1}+\frac{1}{1-4x}\,dx$

8. $\int \frac{8}{5x-1}+\frac{6}{4x-1}-\frac{3}{(3x-1)^2}+\frac{1}{5x}\,dx$

9. $\int \frac{7}{5x-3}+\frac{7}{5x-2}+\frac{7}{(5x-1)^2}+\frac{7}{3x}\,dx$

10. $\int \frac{4}{4x-1}-\frac{6}{1-5x}-\frac{30}{(1+3x)^3}+\frac{1}{\frac{1}{3}x}\,dx$

Question 11

Integrate:

1. $\int 4\sin 2x \, dx$

2. $\int 2\cos(3x+1)\, dx$

3. $\int 2\sin x - 3\cos x \, dx$

4. $\int 4\sin\left(\frac{x}{2}\right) dx$

5. $\int 2\cos 3x - 3\sin 2x \, dx$

6. $\int \frac{1}{2}\cos(2-3x) \, dx$

7. $\int 4\sin(1-2x) \, dx$

8. $\int \frac{1}{2}\mathrm{e}^{2x+3} \, dx$

9. $\int 3\mathrm{e}^{\frac{1}{2}x+1} \, dx$

10. $\int \frac{15}{2}\mathrm{e}^{1-3x} \, dx$

Question 12

Integrate:

1. $\int 6(4x+3)^{\frac{1}{2}}\,dx$

2. $\int \frac{3}{2x-1}\,dx$

3. $\int \frac{10}{(2x+1)^6}\,dx$

4. $\int 5(2x-3)^{\frac{1}{4}}\,dx$

5. $\int \frac{e^{4x}+3}{e^{3x}}\,dx$

6. $\int \frac{3}{4x+1}\,dx$

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

8. $\int \cos x - \sin x\,dx$

9. $\int \sin x - \cos x\,dx$

10. $\int \sin(4x+3)\,dx$

Question 13

Integrate:

1. $\int \cos(5-2x)\,dx$

2. $\int 3\sin 2x\,dx$

3. $\int \sec^2 x\left(1+\cot^2 x\right)dx$

4. $\int (3x+1)^4\,dx$

5. $\int 3(2x+1)^{\frac{1}{2}}\,dx$

6. $\int \dfrac{2}{\cos^2 x}\,dx$

7. $\int (4-5x)^{-1}\,dx$

8. $\int \dfrac{1}{4x}\,dx$

9. $\int \dfrac{x+1}{x}\,dx$

10. $\int \dfrac{4}{(2x-7)^2}\,dx$

Question 14

Integrate:

1. $\int \operatorname{cosec}^2(3x+1)\,dx$

2. $\int 12\sec^2(2x+3)\,dx$

3. $\int 6\mathrm{e}^{2x+2}\,dx$

4. $\int \sec^2 x\left(1-\cot^2 x\right)dx$

5. $\int \tan 2x \sec 2x\,dx$

6. $\int 7(2x-3)^{\frac{5}{2}}\,dx$

7. $\int \frac{3}{\sqrt{4x+1}}\,dx$

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

9. $\int \frac{6x+3}{2x}\,dx$

10. $\int 4(3x-2)^3\,dx$

Question 15

Integrate:

1. $\int \sqrt{x\sqrt{x}}\ dx$

2. $\int \frac{1}{x^2\sqrt[3]{x^2}}\ dx$

3. $\int \frac{3}{\sqrt{2-4x}}\ dx$

4. $\int \frac{4}{\sqrt{6x-1}}\ dx$

5. $\int \operatorname{cosec} 2x \cot 2x\ dx$

6. $\int (2x+1)^3\ dx$

7. $\int \frac{10}{(3x+1)^{\frac{3}{2}}}\ dx$

8. $\int 2^x\ dx$

9. $\int 2^x 3^x\ dx$

10. $\int 3^{2x+1}\ dx$

Question 16

Integrate:

1. $\int \frac{12}{(1-2x)^5}\,dx$

2. $\int (2-3x)^{-2}\,dx$

3. $\int 2\sec^2 x+\frac{1}{2}\sin 2x\,dx$

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

5. $\int 4\cos 3x+\frac{1}{2}\sin 3x\,dx$

6. $\int \frac{4}{2x-1}+\frac{1}{3-4x}dx$

7. $\int \operatorname{cosec}^2 2x\,dx$

8. $\int \frac{7}{3x}\,dx$

9. $\int 4(3-2x)^5\,dx$

10. $\int \frac{1+\sin x}{\cos x}\,dx$

Question 17

Integrate:

1. $\displaystyle\int \frac{\mathrm{e}^{4x}+\mathrm{e}^{-x}}{\mathrm{e}^{2x}}\,dx$

2. $\displaystyle\int \frac{1}{2(3x+1)^4}\,dx$

3. $\displaystyle\int \frac{4}{3(2x+1)}\,dx$

4. $\displaystyle\int \frac{1}{3}\sin 2x-\frac{1}{2}\cos 3x\,dx$

5. $\displaystyle\int \frac{1}{\left(\sqrt{x}-2\right)\left(\sqrt{x}+2\right)}\,dx$

6. $\displaystyle\int \sqrt{x}\left(1+\frac{1}{x}\right)\,dx$

7. $\displaystyle\int \frac{(x+2)^2}{3x}\,dx$

8. $\displaystyle\int 4\mathrm{e}^{-2x}-\frac{1}{3}\sin 3x\,dx$

9. $\displaystyle\int \tan 3x\,dx$

10. $\displaystyle\int \frac{(4x-1)^{-1}}{4}\,dx$

Question 18

Integrate:

1. $\int \left(\mathrm{e}^{x} + 2\mathrm{e}^{-x} \right)^{2} \, dx$

2. $\int x \mathrm{e}^{2} \, dx$

3. $\int \sqrt[3]{x\sqrt{\frac{1}{x}}} \, dx$

4. $\int \left(1 - x^{-2} \right)^{2} \, dx$

5. $\int \cot 2x \, dx$

Question 19

Integrate:

1. $\displaystyle\int_0^2 \frac{1}{\sqrt{4x+1}}\ dx = 1$

2. $\displaystyle\int_0^1 \frac{1}{(2x+1)^4}\ dx = \frac{13}{81}$

3. $\displaystyle\int_0^{\frac{\pi}{4}} \sin\left(2x+\frac{\pi}{4}\right)\ dx = \frac{\sqrt{2}}{2}$

4. $\displaystyle\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \cos 3x\ \ dx = -\frac{1}{3}$

5. $\displaystyle\int_{\ln 2}^{\ln 4} \left(\mathrm{e}^{2x}-2\right)^2\ \ dx = 4\left(9+\ln 2\right)$

6. $\displaystyle\int_0^2 \frac{6}{3x+2}\ \ dx = \ln 16$

7. $\displaystyle\int_0^{\frac{\pi}{4}} \cos\left(3x+\frac{\pi}{4}\right)\ dx = -\frac{\sqrt{2}}{6}$

8. $\displaystyle\int_0^{\frac{\pi}{3}} \cos\left(3x+\frac{\pi}{3}\right)\ dx = -\frac{\sqrt{3}}{3}$

9. $\displaystyle\int_0^{\frac{\pi}{6}} \cos^3 x\ \ dx = \frac{11}{12}$

10. $\displaystyle\int_1^{\mathrm{e}} \left(x^2+1\right)\ln x\ \ dx = \frac{2}{9}\left(\mathrm{e}^3+5\right)$

Question 20

Integrate:

1. $\displaystyle\int_0^1 \frac{9}{(2x+1)^2}\ dx = 3$

2. $\displaystyle\int_0^{\frac{\pi}{6}} \sin\left(4x+\frac{\pi}{6}\right)\ dx = \frac{\sqrt{3}}{16}$

3. $\displaystyle\int_0^1 \frac{4}{2x+3}\ dx = \ln 9$

4. $\displaystyle\int_0^4 \mathrm{e}^{\frac{1}{2}x}\ dx = 2\left(\mathrm{e}^2-1\right)$

5. $\displaystyle\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sec x\ dx = \ln\left|\frac{2}{3}\sqrt{3}+1\right|$

6. $\displaystyle\int_2^4 \frac{8}{(3x-4)^3}\ dx = \frac{5}{16}$

7. $\displaystyle\int_0^{\frac{\pi}{2}} \sin 2x\ dx = 1$