

INTEGRATION BASICS

Question 1

Integrate:

$$1. \quad \int (3x+1)^2 dx = \frac{1}{9}(3x+1)^3 + C$$

$$2. \quad \int 4(2x+1)^5 dx = \frac{1}{3}(2x+1)^6 + C$$

$$3. \quad \int \frac{6}{(2x-1)^2} dx = -\frac{3}{2x-1} + C$$

$$4. \quad \int 6(4x-3)^{\frac{1}{2}} dx = (4x-3)^{\frac{3}{2}} + C$$

$$5. \quad \int \frac{6}{\sqrt{3x+1}} dx = 4\sqrt{3x+1} + C$$

$$6. \quad \int 10(1-4x)^{\frac{3}{2}} dx = -(1-4x)^{\frac{5}{2}} + C$$

$$7. \quad \int 20(1-3x)^4 dx = -\frac{4}{3}(1-3x)^5 + C$$

$$8. \quad \int \sqrt[3]{8x-1} dx = \frac{3}{32}(8x-1)^{\frac{4}{3}} + C$$

$$9. \quad \int \frac{60}{(1-4x)^{\frac{7}{2}}} dx = 6(1-4x)^{-\frac{5}{2}} + C$$

$$10. \quad \int 12\left(3-\frac{1}{2}x\right)^{\frac{1}{2}} dx = -16\left(3-\frac{1}{2}x\right)^{\frac{3}{2}} + C$$

Question 2

Integrate:

1.
$$\int (5x+1)^3 dx = \frac{1}{20}(5x+1)^4 + C$$

2.
$$\int 3(4x+1)^3 dx = \frac{3}{16}(4x+1)^4 + C$$

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

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

5.
$$\int \frac{12}{\sqrt{4x+1}} dx = 6\sqrt{4x+1} + C$$

6.
$$\int 15(1-2x)^{\frac{3}{2}} dx = -3(1-2x)^{\frac{5}{2}} + C$$

7.
$$\int 15(1-6x)^3 dx = -\frac{5}{8}(1-6x)^4 + C$$

8.
$$\int \sqrt[3]{6x-1} dx = \frac{1}{8}(6x-1)^{\frac{4}{3}} + C$$

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

10.
$$\int 30\left(1-\frac{1}{3}x\right)^{\frac{3}{2}} dx = -36\left(1-\frac{1}{3}x\right)^{\frac{5}{2}} + C$$

Question 3

Integrate:

$$1. \int (5x+1)^6 dx = \frac{1}{35}(5x+1)^7 + C$$

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

$$3. \int \frac{12}{(6x-1)^3} dx = -\frac{1}{(6x-1)^2} + C$$

$$4. \int 15(2x-3)^{\frac{3}{2}} dx = 3(2x-3)^{\frac{5}{2}} + C$$

$$5. \int \frac{2}{\sqrt{8x+3}} dx = \frac{1}{2}\sqrt{8x+3} + C$$

$$6. \int \frac{27}{2}(1-2x)^{\frac{7}{2}} dx = -\frac{3}{2}(1-2x)^{\frac{9}{2}} + C$$

$$7. \int 15(1-5x)^7 dx = -\frac{3}{8}(1-5x)^8 + C$$

$$8. \int \sqrt[3]{2x-1} dx = \frac{3}{8}(2x-1)^{\frac{4}{3}} + C$$

$$9. \int \frac{100}{(2-5x)^{\frac{7}{2}}} dx = 8(2-5x)^{-\frac{5}{2}} + C$$

$$10. \int 15\sqrt[4]{1-\frac{1}{4}x} dx = -48\left(1-\frac{1}{4}x\right)^{\frac{5}{4}} + C$$

Question 4

Integrate:

$$1. \int (4x+1)^3 dx = \frac{1}{16}(4x+1)^4 + C$$

$$2. \int 2(3x+1)^4 dx = \frac{2}{15}(3x+1)^5 + C$$

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

$$4. \int 4(3x-2)^{\frac{1}{2}} dx = \frac{8}{9}(3x-2)^{\frac{3}{2}} + C$$

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

$$6. \int 15(2-3x)^{\frac{3}{2}} dx = -2(2-3x)^{\frac{5}{2}} + C$$

$$7. \int 40(3-2x)^5 dx = -\frac{10}{3}(3-2x)^6 + C$$

$$8. \int \sqrt[3]{4x-3} dx = \frac{3}{16}(4x-3)^{\frac{4}{3}} + C$$

$$9. \int \frac{30}{(1-3x)^{\frac{7}{2}}} dx = 4(1-3x)^{-\frac{5}{2}} + C$$

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

Question 5

Integrate:

1. $\int 10 \sin 2x \, dx = -5 \cos 2x + C$

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

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

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

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

6. $\int \sin 2x - \cos 4x \, dx = -\frac{1}{2} \cos 2x - \frac{1}{4} \sin 4x + C$

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

8. $\int 3 \cos 4x - 4 \cos 3x \, dx = \frac{3}{4} \sin 4x - \frac{4}{3} \sin 3x + C$

9. $\int 6 \sin 4x - 4 \sin 6x \, dx = -\frac{3}{2} \cos 4x + \frac{2}{3} \cos 6x + C$

10. $\int 2 \cos 2x - \sin \frac{x}{2} + 6 \sin \frac{2x}{3} \, dx = \sin 2x + 2 \cos \frac{x}{2} - 9 \cos \frac{2x}{3} + C$

Question 6

Integrate:

1. $\int 4 \sin 2x \, dx = -2 \cos 2x + C$

2. $\int 6 \cos 2x \, dx = 3 \sin 2x + C$

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

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

5. $\int 8 \cos 2x - 12 \sin 3x \, dx = 4 \sin 2x + 4 \cos 3x + C$

6. $\int \sin 3x - \cos 6x \, dx = -\frac{1}{3} \cos 3x - \frac{1}{6} \sin 6x + C$

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

8. $\int 5 \cos 2x - 2 \cos 5x \, dx = \frac{5}{2} \sin 2x - \frac{2}{5} \sin 5x + C$

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

10. $\int 4 \cos 2x - \frac{1}{2} \sin \frac{x}{4} + 9 \sin \frac{3x}{2} \, dx = 2 \sin 2x + 2 \cos \frac{x}{4} - 6 \cos \frac{3x}{2} + C$

Question 7

Integrate:

$$1. \int 5 \sin 2x \, dx = -\frac{5}{2} \cos 2x + C$$

$$2. \int 3 \cos 6x \, dx = \frac{1}{2} \sin 6x + C$$

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

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

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

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

$$7. \int 2 \cos \frac{1}{3}x + 3 \sin \frac{1}{2}x \, dx = 6 \sin \frac{1}{3}x - 6 \cos \frac{1}{2}x + C$$

$$8. \int 7 \cos 3x - 3 \cos 7x \, dx = \frac{7}{3} \sin 3x - \frac{3}{7} \sin 7x + C$$

$$9. \int \frac{1}{2} \sin 5x - \frac{1}{2} \sin \frac{1}{4}x \, dx = -\frac{1}{10} \cos 5x + 2 \cos \frac{1}{4}x + C$$

$$10. \int 10 \cos 2x - \sin \frac{x}{4} + 9 \sin \frac{3x}{2} \, dx = 5 \sin 2x + 4 \cos \frac{x}{4} - 6 \cos \frac{3x}{2} + C$$

Question 8

Integrate:

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

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

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

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

$$5. \int 5e^{\frac{1}{2}x} - \frac{1}{2}e^{-\frac{1}{2}x} + \frac{3}{4}e^{\frac{1}{4}x} dx = 10e^{\frac{1}{2}x} + e^{-\frac{1}{2}x} + 3e^{\frac{1}{4}x} + C$$

$$6. \int \frac{1}{x+1} + \frac{1}{2x-1} + \frac{1}{2-x} dx = \ln|x+1| + \frac{1}{2}\ln|2x-1| - \ln|2-x| + C$$

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

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

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

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

Question 9

Integrate:

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

$$2. \int 6e^{2x} + e^{-2x} - 3e^{-x} dx = 3e^{2x} - \frac{1}{2}e^{-2x} + 3e^{-x} + C$$

$$3. \int 3e^{2x} - 2e^{-2x} + \frac{1}{2}e^{4x} dx = \frac{3}{2}e^{2x} + e^{-2x} + \frac{1}{8}e^{4x} + C$$

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

$$5. \int 3e^{\frac{1}{2}x} - \frac{1}{2}e^{-\frac{1}{4}x} + 3e^{\frac{3}{2}x} dx = 6e^{\frac{1}{2}x} + 2e^{-\frac{1}{4}x} + 2e^{\frac{3}{2}x} + C$$

$$6. \int \frac{1}{x+2} + \frac{1}{3x-1} + \frac{1}{1-x} dx = \ln|x+2| + \frac{1}{3}\ln|3x-1| - \ln|1-x| + C$$

$$7. \int \frac{6}{3x+1} + \frac{4}{2x-1} + \frac{1}{1-4x} dx = 2\ln|3x+1| + 2\ln|2x-1| - \frac{1}{4}\ln|1-4x| + C$$

$$8. \int \frac{8}{4x-1} + \frac{5}{2x-1} - \frac{2}{1-3x} + \frac{4}{x} dx = 2\ln|4x-1| + \frac{5}{2}\ln|2x-1| + \frac{2}{3}\ln|1-3x| + 4\ln|x| + C$$

$$9. \int \frac{9}{3x-1} + \frac{2}{6x-1} - \frac{2}{(1-2x)^2} + \frac{1}{2x} dx = 3\ln|3x-1| + \frac{1}{3}\ln|6x-1| - \frac{1}{1-2x} + \frac{1}{2}\ln|x| + C$$

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

Question 10

Integrate:

$$1. \int 2e^x + 2e^{2x} + 3e^{-x} dx = 2e^x + e^{2x} - 3e^{-x} + C$$

$$2. \int 8e^{2x} - 3e^{-2x} + 5e^{3x} dx = 4e^{2x} + \frac{3}{2}e^{-2x} + \frac{5}{3}e^{3x} + C$$

$$3. \int \frac{1}{2}e^{4x} - e^{-4x} + 2e^{\frac{1}{2}x} dx = \frac{1}{8}e^{4x} + \frac{1}{4}e^{-4x} + 4e^{\frac{1}{2}x} + C$$

$$4. \int 2e^{-3x+1} - 3e^{1-x} + \frac{1}{3}e^{3x} dx = -\frac{2}{3}e^{-3x+1} + 3e^{1-x} + \frac{1}{9}e^{3x} + C$$

$$5. \int 2e^{1-\frac{1}{2}x} - \frac{1}{3}e^{-\frac{1}{6}x} + \frac{3}{2}e^{\frac{1}{2}x} dx = -4e^{1-\frac{1}{2}x} + 2e^{-\frac{1}{6}x} + 3e^{\frac{1}{2}x} + C$$

$$6. \int \frac{1}{4x+1} + \frac{3}{3x-1} + \frac{4}{1-x} dx = \frac{1}{4}\ln|4x+1| + \ln|3x-1| - 4\ln|1-x| + C$$

$$7. \int \frac{6}{3x+1} + \frac{3}{3x-1} + \frac{1}{1-4x} dx = 2\ln|3x+1| + \ln|3x-1| - \frac{1}{4}\ln|1-4x| + C$$

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

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

$$10. \int \frac{4}{4x-1} - \frac{6}{1-5x} - \frac{30}{(1+3x)^3} + \frac{1}{\frac{1}{3}x} dx = \ln|4x-1| + \frac{6}{5}\ln|1-5x| + \frac{5}{(1+3x)^2} + 3\ln|x| + C$$

Question 11

Integrate:

1. $\int 4 \sin 2x \, dx = -2 \cos 2x + C$

2. $\int 2 \cos(3x+1) \, dx = \frac{2}{3} \sin(3x+1) + C$

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

4. $\int 4 \sin\left(\frac{x}{2}\right) \, dx = -8 \cos\left(\frac{x}{2}\right) + C$

5. $\int 2 \cos 3x - 3 \sin 2x \, dx = \frac{2}{3} \sin 3x + \frac{3}{2} \cos 2x + C$

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

7. $\int 4 \sin(1-2x) \, dx = 2 \cos(1-2x) + C$

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

9. $\int 3e^{\frac{1}{2}x+1} \, dx = 6e^{\frac{1}{2}x+1} + C$

10. $\int \frac{15}{2} e^{1-3x} \, dx = -\frac{5}{2} e^{1-3x} + C$

Question 12

Integrate:

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

$$2. \int \frac{3}{2x-1} dx = \frac{3}{2} \ln|2x-1| + C$$

$$3. \int \frac{10}{(2x+1)^6} dx = -\frac{1}{(2x+1)^5} + C$$

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

$$5. \int \frac{e^{4x}+3}{e^{3x}} dx = e^x - e^{-3x} + C$$

$$6. \int \frac{3}{4x+1} dx = \frac{3}{4} \ln|4x+1| + C$$

$$7. \int \left(1 + \frac{1}{x}\right)^2 dx = x + 2\ln|x| - \frac{1}{x} + C$$

$$8. \int \cos x - \sin x dx = \sin x + \cos x + C$$

$$9. \int \sin x - \cos x dx = -\cos x - \sin x + C$$

$$10. \int \sin(4x+3) dx = -\frac{1}{4} \cos(4x+3) + C$$

Question 13

Integrate:

$$1. \int \cos(5-2x) \, dx = -\frac{1}{2} \sin(5-2x) + C$$

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

$$3. \int \sec^2 x (1 + \cot^2 x) \, dx = \tan x - \cot x + C$$

$$4. \int (3x+1)^4 \, dx = \frac{1}{15} (3x+1)^5 + C$$

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

$$6. \int \frac{2}{\cos^2 x} \, dx = 2 \tan x + C$$

$$7. \int (4-5x)^{-1} \, dx = -\frac{1}{5} \ln|4-5x| + C$$

$$8. \int \frac{1}{4x} \, dx = \frac{1}{4} \ln|x| + C$$

$$9. \int \frac{x+1}{x} \, dx = x + \ln|x| + C$$

$$10. \int \frac{4}{(2x-7)^2} \, dx = -\frac{2}{2x-7} + C$$

Question 14

Integrate:

$$1. \int \operatorname{cosec}^2(3x+1) dx = -\frac{1}{3} \cot(3x+1) + C$$

$$2. \int 12 \sec^2(2x+3) dx = 6 \tan(2x+3) + C$$

$$3. \int 6e^{2x+2} dx = 3e^{2x+2} + C$$

$$4. \int \sec^2 x (1 - \cot^2 x) dx = \tan x + \cot x + C$$

$$5. \int \tan 2x \sec 2x dx = \frac{1}{2} \sec 2x + C$$

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

$$7. \int \frac{3}{\sqrt{4x+1}} dx = \frac{3}{2} \sqrt{4x+1} + C$$

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

$$9. \int \frac{6x+3}{2x} dx = 3x + \frac{3}{2} \ln|x| + C$$

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

Question 15

Integrate:

$$1. \int \sqrt{x}\sqrt{x} \, dx = \frac{4}{7}x^{\frac{7}{2}} + C$$

$$2. \int \frac{1}{x^2\sqrt[3]{x^2}} \, dx = -\frac{3}{5}x^{-\frac{5}{3}} + C = -\frac{3}{5\sqrt[3]{x^5}} + C$$

$$3. \int \frac{3}{\sqrt{2-4x}} \, dx = -\frac{3}{2}\sqrt{2-4x} + C$$

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

$$5. \int \operatorname{cosec} 2x \cot 2x \, dx = -\frac{1}{2}\operatorname{cosec} 2x + C$$

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

$$7. \int \frac{10}{(3x+1)^{\frac{3}{2}}} \, dx = -\frac{20}{3\sqrt{3x+1}} + C$$

$$8. \int 2^x \, dx = \frac{2^x}{\ln 2} + C$$

$$9. \int 2^x 3^x \, dx = \frac{6^x}{\ln 6} + C$$

$$10. \int 3^{2x+1} \, dx = \frac{3^{2x+1}}{\ln 9} + C$$

Question 16

Integrate:

$$1. \int \frac{12}{(1-2x)^5} dx = \frac{3}{2(1-2x)^4} + C$$

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

$$3. \int 2 \sec^2 x + \frac{1}{2} \sin 2x \, dx = 2 \tan x - \frac{1}{4} \cos 2x + C$$

$$4. \int \frac{3}{x} + \frac{4}{x^2} - \frac{2}{x^3} \, dx = 3 \ln|x| - \frac{4}{x} + \frac{1}{x^2} + C$$

$$5. \int 4 \cos 3x + \frac{1}{2} \sin 3x \, dx = \frac{4}{3} \sin 3x - \frac{1}{6} \cos 3x + C$$

$$6. \int \frac{4}{2x-1} + \frac{1}{3-4x} \, dx = 2 \ln|2x-1| - \frac{1}{4} \ln|3-4x| + C$$

$$7. \int \operatorname{cosec}^2 2x \, dx = -\frac{1}{2} \cot 2x + C$$

$$8. \int \frac{7}{3x} \, dx = \frac{7}{3} \ln|x| + C$$

$$9. \int 4(3-2x)^5 \, dx = -\frac{1}{3}(3-2x)^6 + C$$

$$10. \int \frac{1+\sin x}{\cos x} \, dx = \ln|\sec^2 x + \sec x \tan x| + C = -\ln|1-\sin x| + C$$

Question 17

Integrate:

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

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

$$3. \int \frac{4}{3(2x+1)} dx = \frac{2}{3} \ln|2x+1| + C$$

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

$$5. \int \frac{1}{(\sqrt{x}-2)(\sqrt{x}+2)} dx = \ln|x-4| + C$$

$$6. \int \sqrt{x} \left(1 + \frac{1}{x}\right) dx = \frac{2}{3} x^{\frac{3}{2}} + 2x^{\frac{1}{2}} + C$$

$$7. \int \frac{(x+2)^2}{3x} dx = \frac{1}{6}x^2 + \frac{4}{3}x + \frac{4}{3} \ln|x| + C$$

$$8. \int 4e^{-2x} - \frac{1}{3} \sin 3x dx = -2e^{-2x} + \frac{1}{9} \cos 3x + C$$

$$9. \int \tan 3x dx = \frac{1}{3} \ln|\sec 3x| + C$$

$$10. \int \frac{(4x-1)^{-1}}{4} dx = \frac{1}{16} \ln|4x-1| + C$$

Question 18

Integrate:

1. $\int (e^x + 2e^{-x})^2 dx = \frac{1}{2}e^{2x} + 4x - 2e^{-2x} + C$

2. $\int xe^2 dx = \frac{1}{2}e^2 x^2 + C$

3. $\int \sqrt[3]{x\sqrt{\frac{1}{x}}} dx = \frac{6}{7}x^{\frac{7}{6}} + C$

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

5. $\int \cot 2x dx = \frac{1}{2} \ln |\sin 2x| + C$

Question 19

Integrate:

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

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

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

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

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

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

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

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

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

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

Question 20

Integrate:

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

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

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

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

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

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

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