

Find the following integrals

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

Use the substitution

$$u = 5x + 4$$

$$du = 5 dx$$

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

Simplify the fraction by performing long division.

To solve the second integral use the substitution

$$u = x^2 + 1$$

$$du = 2x dx$$

$$3. \int 3t^2 (t^3 + 4)^5 dt$$

Use the substitution

$$u = t^3 + 4$$

$$du = 3t^2 dt$$

$$4. \int \sqrt{4x - 5} dx$$

Use the substitution

$$u = 4x - 5$$

$$du = 4 dx$$

$$5. \int t^2 (t^3 + 4)^{-1/2} dt$$

Use the substitution

$$u = t^3 + 4$$

$$du = 3t^2 dt$$

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

Use the substitution

$$u = 2x + 1$$

$$du = 2 dx$$

$$7. \int 4xe^{x^2+1} dx$$

Use the substitution

$$u = x^2 + 1$$

$$du = 2x dx$$

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

Use the substitution

$$u = \sqrt{x} - 1$$

$$du = \frac{1}{2\sqrt{x}} dx$$

$$9. \int \sqrt{x^3 + x^2} (3x^2 + 2x) dx$$

Use the substitution

$$u = x^3 + x^2$$

$$du = (3x^2 + 2) dx$$



$$10. \int_0^1 \frac{x+1}{(x^2+2x+2)^3} dx$$

Use the substitution

$$u = x^2 + 2x + 2 \quad du = (2x + 2) dx = 2(x + 1) dx$$

$$11. \int (x+1) \sin(x^2+2x+1) dx$$

Use the substitution

$$u = x^2 + 2x + 1 \quad du = (2x + 2) dx = 2(x + 1) dx$$

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

Use the substitution

$$u = 1 + \frac{1}{x} \quad du = -\frac{1}{x^2} dx$$

$$13. \int x^2 \sqrt{x^3+1} dx$$

Use the substitution

$$u = x^3 + 1 \quad du = 3x^2 dx$$

$$14. \int \frac{2}{\sqrt{4x-7}} dx$$

Use the substitution

$$u = 4x - 7 \quad du = 4 dx$$

$$15. \int \frac{1}{\sqrt{x}(\sqrt{x}+1)^2} dx$$

Use the substitution

$$u = \sqrt{x} + 1 \quad du = \frac{1}{2\sqrt{x}} dx$$

$$16. \int \frac{4x^2 - 8x + 5}{2x - 3} dx$$

Simplify the fraction by performing long division,

To solve the last integral use the substitution

$$u = 2x - 3 \quad du = 2 dx$$

$$17. \int_{-1}^1 \frac{x}{\sqrt{x+1}} dx$$

Use the substitution

$$u = x + 1 \quad du = dx$$

$$18. \int x\sqrt{3x+2} dx$$

Use the substitution

$$u = 3x + 2, \Rightarrow x = \frac{u-2}{3} \quad du = 3 dx$$

$$19. \int \sqrt{x} \sqrt{x\sqrt{x} + 1} dx$$

Use the substitution

$$u = x^{3/2} + 1 \quad du = \frac{3}{2}x^{1/2} dx$$

$$20. \int x^3 \sqrt{x^2 + 7} dx$$

Use the substitution

$$u = x^2 + 7 \Rightarrow x^2 = u - 7 \quad du = 2x dx$$

$$21. \int (x^2 + 1) \sqrt{x - 2} dx$$

Use the substitution

$$u = x - 2 \Rightarrow x = u + 2 \quad du = dx$$

$$22. \int \frac{e^x}{e^x + 1} dx$$

Use the substitution

$$u = e^x + 1 \quad du = e^x dx$$

$$23. \int 3x^3 (x^2 + 4)^5 dx$$

Use the substitution

$$u = x^2 + 4 \Rightarrow x^2 = u - 4 \quad du = 2x dx$$

$$24. \int \frac{x^2 + 2x}{x^2 + 2x + 1} dx$$

First, simplify by using long division

To solve the second integral use the substitution

$$u = x + 1 \quad du = dx$$

$$25. \int \frac{1}{x^2 + 8x + 16} dx$$

Use the substitution

$$u = x + 4 \quad du = dx$$

$$26. \int \frac{3x^2 + 6x + 2}{2x^2} dx$$

Rewrite 
$$\int \frac{3x^2 + 6x + 2}{2x^2} dx = \int \left( \frac{3}{2} + 3x^{-1} + x^{-2} \right) dx$$

There is no need for a substitution



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

Use the substitution

$$u = x - 2 \Rightarrow x = u + 2 \quad du = dx$$

$$28. \int \frac{(5 + \ln x)^5}{x} dx$$

Use the substitution

$$u = 5 + \ln x \quad du = \frac{1}{x} dx$$