

1. Integrate (use method of partial fractions in necessary)

(a) $\int \frac{x^3}{x^2 - 1} dx$

(b) $\int \frac{10x + 9}{2x^2 + 5x - 3} dx$

(c) $\int \frac{1}{x(x+1)(2x+3)} dx$

(d) $\int \frac{3x^2 - 2}{(x+2)^3} dx$

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

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

(g) $\int \frac{2x + 3}{x(x^2 + 3)} dx$

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

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

(j) $\int \frac{x^2}{(x^2 + 9)^2} dx$

(k) $\int \frac{12}{x^3 + 8} dx$

2. Show that

$$\int \frac{1}{x^2 - a^2} dx = \frac{1}{2a} \ln \left| \frac{x - a}{x + a} \right| + C$$

3. Evaluate

$$\int \frac{1}{e^x + 4} dx.$$