**201-203-RE - Practice Set #9: Integration by Partial Fractions**

Evaluate the following integrals.

(1) $\displaystyle\int \frac{3x^2+11x+16}{(2x+3)(x^2-1)}\,dx$

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

(3) $\displaystyle\int \frac{7x^2-9x-2}{x^3-2x^2}\,dx$

(4) $\displaystyle\int \frac{5-x}{x^2+8x+15}\,dx$

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

(6) $\displaystyle\int \frac{2x^3-4x^2-15x+5}{x^2-2x-8}\,dx$

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

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

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

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

(11) $\displaystyle\int \frac{4x^3+20x^2+14x-11}{x^2+5x+4}\,dx$

(12) $\displaystyle\int \frac{2x^2-4x-12}{x^3+3x^2}\,dx$

(13) $\displaystyle\int \frac{4x^2+7x+9}{(x+3)(x+1)^2}\,dx$

(14) $\displaystyle\int \frac{4x^2+23x-22}{(x+4)(x-1)^2}\,dx$

(15) $\displaystyle\int \frac{9x^2+59x+66}{(x-3)(x+3)^2}\,dx$

(16) $\displaystyle\int \frac{6x^4-12x^3+6x^2+2x+1}{(x-1)^2}\,dx$

(17) $\displaystyle\int \frac{x^4+4x^3-x+20}{x^2+4x}\,dx$

(18) $\displaystyle\int \frac{12x^4-12x^3+3x^2-8x+5}{2x^2+x}\,dx$

(19) $\displaystyle\int \frac{3x^3-13x+6}{x^2-4}\,dx$

(20) $\displaystyle\int \frac{2x^4+8x^3+3x^2+4x+16}{x^3+4x^2}\,dx$

(21) $\displaystyle\int \frac{8x^4+16x^3-3x^2+2x-8}{x^2(x+2)}\,dx$

(22) $\displaystyle\int \frac{5x^3-79x-28}{x^2-16}\,dx$

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**ANSWERS:**

(1) $\frac{5}{2}\ln|2x+3| - 4\ln|x+1| + 3\ln|x-1| + C$

(2) $\frac{1}{2}x^2 + 5\ln|x| - 4\ln|x-3| + C$

(3) $2\ln|x-2| + 5\ln|x| - \frac{1}{x} + C$

(4) $4\ln|x+3| - 5\ln|x+5| + C$

(5) $\frac{1}{2}x^2 + 3\ln|2x+1| - 4\ln|x| + C$

(6) $x^2 + \frac{3}{2}\ln|x-4| - \frac{1}{2}\ln|x+2| + C$

(7) $\frac{1}{x} + \ln|x^4+x^3| + C$

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

(9) $3\ln|x-3| - \frac{9}{x-3} + C$

(10) $2x - \ln|x| - \frac{4}{x} - 2\ln|x+1| + C$

(11) $2x^2 - 3\ln|x+1| + \ln|x+4| + C$

(12) $2\ln|x+3| + \frac{4}{x} + C$

(13) $6\ln|x+3| - 2\ln|x+1| - \frac{3}{x+1} + C$

(14) $6\ln|x-1| - \frac{1}{x-1} - 2\ln|x+4| + C$

(15) $9\ln|x-3| - \frac{5}{x+3} + C$

(16) $2x^3 + 2\ln|x-1| - \frac{3}{x-1} + C$

(17) $\frac{1}{3}x^3 + 5\ln|x| - 6\ln|x+4| + C$

(18) $2x^3 - \frac{9}{2}x^2 + 6x + 5\ln|x| - 12\ln|2x+1| + C$

(19) $\frac{3}{2}x^2 - 2\ln|x+2| + \ln|x-2| + C$

(20) $x^2 - \frac{4}{x} + 3\ln|x+4| + C$

(21) $4x^2 + \frac{4}{x} + 3\ln|x| - 6\ln|x+2| + C$

(22) $\frac{5}{2}x^2 - 3\ln|x-4| + 4\ln|x+4| + C$