3. RATIONAL EXPRESSIONS

1. Write a rational expression whose numerator is a cubic polynomial and denominator is a quadratic polynomial.
2. Write a rational expression whose numerator is a binomial and denominator is a trinomial.
3. Write a polynomial whose numerator is a quadratic polynomial with zeros 3 and ½ and denominator is a quadratic polynomial with zeros, –3/4 and 4.
4. Find the product of additive inverses of $\frac{5x+2}{5x-3}$ and $\frac{x+6}{x+2}$.
5. Find the sum of the reciprocals of $\frac{x+3}{x^2+1}$ and $\frac{x+3}{x-3}$.
6. Simplify:

$$\frac{\frac{3x^2}{x^2-x-2}}{\frac{x^2}{x^2+4x+3}}-\frac{4}{x^2+x-6}$$

7. What should be subtracted from the expression $\frac{2x+3}{6x^2-5}$ to get its reciprocal?
8. Simplify

$$\frac{1}{x-1}-\frac{1}{x+1}-\frac{2}{x^2+1}-\frac{4}{x^4+1}$$

9. If $m=\frac{x+1}{x-1}$ and $n=\frac{x-1}{x+1}$, find m^2+n^2-mn.
10. Simplify:

$$\frac{1}{x+a}+\frac{1}{x+b}+\frac{1}{x+c}+\frac{ax}{x^3+ax^2}+\frac{bx}{x^3+bx^2}+\frac{cx}{x^3+cx^2}.$$

11. If $A=4x+\frac{1}{x}$, find $A+1/A$
12. Simplify $\sqrt{\frac{(x^2+3x+2)(x^2+5x+6)}{x^2(x^2+4x+3)}}$
13. Simplify $\frac{(x-y)^2-z^2}{xy-y^2yz}\div\frac{x^2+xy-zx}{z}\div\frac{xz-yz-z^2}{x^2-(y-z)^2}$
14. Simplify $\frac{1}{(1-x)(x-y)}+\frac{x^2}{(1-x)(y-x)}-\frac{y^2}{(y-1)(x-y)}$
15. Simplify: $a^3(b-c)+b^3(c-a)+c^3(a-b)$

ANSWERS

1. $\dfrac{a^3 + ax^2 + bx + c}{x^2 dx + e}$
2. $\dfrac{ax + b}{cx^2 + dx + e}$
3. $\dfrac{k\left(2x^2 - 7x + 3\right)}{\left(4x^2 - 13x - 12\right)}$
4. $\dfrac{5x^2 + 32x + 12}{5x^2 + 7x - 6}$
5. $\dfrac{2\left(x^2 - 1\right)}{(x + 3)}$
6. $\dfrac{3x^2 + 18x + 23}{x^2 + x - 6}$
7. $\dfrac{-36x^4 + 64x^2 + 12x - 16}{12x^3 + 18x^2 - 10x - 15}$
8. $\dfrac{8}{8x^8 - 1}$
9. $\dfrac{x^4 + 14x^2 + 1}{x^4 - 2x^2 + 1}$
10. $\dfrac{3}{x}$
11. $\dfrac{16x^4 + 9x^2 + 1}{4x^3 + x}$
12. $\dfrac{x + 2}{x}$
13. $\dfrac{x - y + z}{xy}$
14. 1
15. $-(a - b)(b - c)(c - a)(a + b + c)$