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1. Which of the following expressions are polynomials in one variable, and which are not? State reasons for your answer.

(i) $4x^2–3x+7$

Solution:

The equation $4x^2–3x+7$ can be written as $4x^2–3x^1+7x^0$

Since *x* is the only variable in the given equation and the powers of x (i.e. 2, 1 and 0) are whole numbers, we can say that the expression $4x^2–3x+7$ is a polynomial in one variable.

(ii) $y^2+\sqrt{2}$

Solution:

The equation $y^2+\sqrt{2}$ can be written as $y^2+\sqrt{2}y^0$

Since y is the only variable in the given equation and the powers of y (i.e., 2 and 0) are whole numbers, we can say that the expression $y^2+\sqrt{2}$ is a polynomial in one variable.

(iii) $3\sqrt{t}+t\sqrt{2}$

Solution:

The equation $3\sqrt{t}+t\sqrt{2}$ can be written as $3t^{1/2}+\sqrt{2}t$

Though *t* is the only variable in the given equation, the power of *t* (i.e., 1/2) is not a whole number. Hence, we can say that the expression $3\sqrt{t}+t\sqrt{2}$ is **not** a polynomial in one variable.

(iv) y+2/y

Solution:

The equation y+2/y can be written as $y+2y^{-1}$

Though *y* is the only variable in the given equation, the power of *y* (i.e., -1) is not a whole number. Hence, we can say that the expression y+2/y is **not** a polynomial in one variable.

(v) $x^{10}+y^3+t^{50}$

Solution:

Here, in the equation $x^{10}+y^3+t^{50}$

Though the powers, 10, 3, 50, are whole numbers, there are 3 variables used in the expression

$x^{10}+y^3+t^{50}$. Hence, it is **not** a polynomial in one variable.

2. Write the coefficients of x^2 in each of the following:

(i) $2+x^2+x$

Solution:

The equation $2+x^2+x$ can be written as $2+(1)x^2+x$

We know that the coefficient is the number which multiplies the variable.

Here, the number that multiplies the variable x^2 is 1

Hence, the coefficient of x^2 in $2+x^2+x$ is 1.

(ii) $2–x^2+x^3$

Solution:

The equation $2–x^2+x^3$ can be written as $2+(–1)x^2+x^3$

We know that the coefficient is the number (along with its sign, i.e. – or +) which multiplies the variable.

Here, the number that multiplies the variable x^2 is -1

Hence, the coefficient of x^2 in $2–x^2+x^3$ is -1.

(iii) $(\pi/2)x^2+x$

Solution:

The equation $(\pi/2)x^2 +x$ can be written as $(\pi/2)x^2 + x$

We know that the coefficient is the number (along with its sign, i.e. – or +) which multiplies the variable.

Here, the number that multiplies the variable x^2 is $\pi/2$.

Hence, the coefficient of x^2 in $(\pi/2)x^2 +x$ is $\pi/2$.

(iii)$\sqrt{2}x-1$

Solution:

The equation $\sqrt{2}x-1$ can be written as $0x^2+\sqrt{2}x-1$ [Since $0x^2$ is 0]

We know that the coefficient is the number (along with its sign, i.e. – or +) which multiplies the variable.

Here, the number that multiplies the variable $x^2$is 0

Hence, the coefficient of x^2 in $\sqrt{2}x-1$ is 0.

3. Give one example each of a binomial of degree 35, and of a monomial of degree 100.

Solution:

Binomial of degree 35: A polynomial having two terms and the highest degree 35 is called a binomial of degree 35.

For example, $3x^{35}+5$

Monomial of degree 100: A polynomial having one term and the highest degree 100 is called a monomial of degree 100.

For example, $4x^{100}$

4. Write the degree of each of the following polynomials:

(i) $5x^3+4x^2+7x$

Solution:

The highest power of the variable in a polynomial is the degree of the polynomial.

Here, $5x^3+4x^2+7x = 5x^3+4x^2+7x^1$

The powers of the variable x are: 3, 2, 1

The degree of $5x^3+4x^2+7x$ is 3, as 3 is the highest power of x in the equation.

(ii) $4–y^2$

Solution:

The highest power of the variable in a polynomial is the degree of the polynomial.

Here, in $4–y^2$,

The power of the variable y is 2

The degree of $4–y^2$ is 2, as 2 is the highest power of y in the equation.

(iii) $5t–\sqrt{7}$

Solution:

The highest power of the variable in a polynomial is the degree of the polynomial.

Here, in $5t–\sqrt{7}$

The power of the variable t is: 1

The degree of $5t–\sqrt{7}$ is 1, as 1 is the highest power of y in the equation.

(iv) 3

Solution:

The highest power of the variable in a polynomial is the degree of the polynomial.

Here, $3 = 3\times1 = 3\times x^0$

The power of the variable here is: 0

Hence, the degree of 3 is 0.

5. Classify the following as linear, quadratic and cubic polynomials:

Solution:

We know that,

Linear polynomial: A polynomial of degree one is called a linear polynomial.

Quadratic polynomial: A polynomial of degree two is called a quadratic polynomial.

Cubic polynomial: A polynomial of degree three is called a cubic polynomial.

(i) x^2+x

Solution:

The highest power of x^2+x is 2

The degree is 2

Hence, x^2+x is a quadratic polynomial

(ii) $x - x^3$

Solution:

The highest power of $x - x^3$ is 3

The degree is 3

Hence, $x - x^3$ is a cubic polynomial

(iii) $y+y^2+4$

Solution:

The highest power of $y+y^2+4$ is 2

The degree is 2

Hence, $y+y^2+4$ is a quadratic polynomial

(iv) $1+x$

Solution:

The highest power of $1+x$ is 1

The degree is 1

Hence, $1+x$ is a linear polynomial.

(v) $3t$

Solution:

The highest power of $3t$ is 1

The degree is 1

Hence, $3t$ is a linear polynomial.

(vi) r^2

Solution:

The highest power of r^2 is 2

The degree is 2

Hence, r^2 is a quadratic polynomial.

(vii) $7x^3$

Solution:

The highest power of $7x^3$ is 3

The degree is 3

Hence, $7x^3$ is a cubic polynomial.