Polynomial Exercise -1

Question 1:
Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer.
$4x^2 - 3x + 7$
$y^2 + \sqrt{2}$
$3\sqrt{t} + t\sqrt{2}$
$y + 2/y$
$x^{10} + y^3 + t^{50}$

Solution:
(i) $4x^2 - 3x + 7$
Yes, this expression is a polynomial in one variable x.
(ii) $y^2 + \sqrt{2}$

Yes, this expression is a polynomial in one variable y.
(iii) $3\sqrt{t} + t\sqrt{2}$
No. It can be observed that the exponent of variable t in term $3\sqrt{t}$ is 1/2, which is not a whole number. Therefore, this expression is not a polynomial.
(iv) y+2/y
No. It can be observed that the exponent of variable y in term 2/y is -1 which is not a whole number. Therefore, this expression is not a polynomial.
(v) $x^{10} + y^3 + t^{50}$

No. It can be observed that this expression is a polynomial in 3 variables x, y, and t. Therefore, it is not a polynomial in one variable.

Question 2
Write the coefficients of $x2$ in each of the following:

   i) $2 + x^2 + x$
   ii) $2 - x^2 + x^3$
   iii) $(\pi/2)x^2 + x$
   iv) $\sqrt{2}\ x - 1$

Solution:
(i) $2+x^2+x$
Coefficient of x^2 is 1.
(ii) $2-x^2+x^3$

Coefficient of x^2 is -1.

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

Coefficient of x^2 is $(\pi/2)$

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

There is no term consisting of x^2. Therefore, coefficient of x^2 is 0.

Question 3

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

Solution:

Degree of a polynomial is the highest power of variable in the polynomial.

Binomial has two terms in it. So binomial of degree 35 can be written as $x^{35} + 1$.   Monomial has only one term in it. So monomial of degree 100 can be written as x^{100}.

Question 4.

Write the degree of each of the following polynomials:

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

(ii) $4 - y^2$

(iii) $5t - \sqrt{7}$

(iv) 3

Solution:

i) This is a polynomial in variable x and the highest power of variable x is 3 Therefore, the degree of this polynomial is 3.

ii) This is a polynomial in variable y and the highest power of variable y is 2. Therefore, the degree of this polynomial is 2.

(iii)

This is a polynomial in variable t and the highest power of variable t is 1. Therefore, the degree of this polynomial is 1.

(iv)

This is a constant polynomial. Degree of a constant polynomial is always 0.

Question 5

Classify the following as linear, quadratic and cubic polynomials:

(i) $x^2 + x$

(ii) $x - x^3$

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

(iv) $1 + x$

(v) $3t$

(vi) r^2

(vii) $7x^3$

Solution:

(i) $2 + x^2 + x$ is a quadratic polynomial as its degree is 2.
(ii) $x - x^3$ is a cubic polynomial as its degree is 3.
(iii) $y + y^2 + 4$ is a quadratic polynomial as its degree is 2.
(iv) $1 + x$ is a linear polynomial as its degree is 1.
(v) $3t$ is a linear polynomial as its degree is 1.
(vi) r^2 is a quadratic polynomial as its degree is 2.
(vii) $7x^3$ is a cubic polynomial as its degree is 3.