Polynomials: Exercise 2.1

Q.1 Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer.
(i) $4x^2 - 3x + 7$
(ii) $y^2 + \sqrt{2}$
(iii) $\sqrt{t} + t\sqrt{2}$
(iv) $y + \dfrac{2}{y}$
(v) $x^{10} + y^3 + t^{50}$

Sol. (i) In $4x^2 - 3x + 7$, all the power of variable x is whole numbers so it is a polynomial in one variable x.

(ii) In $y^2 + \sqrt{2}$, the power of y is a whole number. So it is a polynomial of one variable y.

(iii) In $3\sqrt{t} + t\sqrt{2} = 3t^{\frac{1}{2}} + \sqrt{2}\,t$,

In given expression, the exponent of the first term is $\dfrac{1}{2}$, which is not a whole number. Hence, it is not a polynomial.

(iv) $y + \dfrac{2}{y} = y + 2y^{-1}$, in given expression, the exponent of the second term is -1, which is not a whole number. So it is not a polynomial.

(v) $x^{10} + y^3 + t^{50}$ is not a polynomial in one variable because in given expression three variables x, y, t are present.

Q.2 Write the coefficients of x^2 in each of the following:
(i) $2 + x^2 + x$
(ii) $2 - x^2 + x^3$
(iii) $\dfrac{\pi}{2}x^2 + x$
(iv) $\sqrt{2x} - 1$

Sol.
Coefficient of x^2:
(i) in given expression, $2 + x^2 + x$ is 1.
(ii) in given expression, $2 - x^2 + x^3$ is -1.

(iii) in given expression, $\dfrac{\pi}{2}x^2 + x$ is $\dfrac{\pi}{2}$.

(iv) in given expression, $\sqrt{2x} - 1$ is 0.

Q.3 Give one example each of a binomial of degree 35, and of a monomial of degree 100.
Sol. Examples:
(i) Binomial of degree 35 may be taken as $y^{35} + 4y$
(ii) Monomial of degree 100 may be taken as $5t^{100}$

Q.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**

***Sol* (i)** In given expression, the highest power term is $5x^3$ and its exponent is 3. So, the degree is 3.
(ii) In given expression, the highest power term is $-y^2$ and its exponent is 2. So, the degree is 2.
(iii) In given expression, the highest power term is $5t$ and its exponent is 1. So, the degree is 1.
(iv) In given expression, only term here is 3 which can be written as $3x^0$ and so the exponent is 0. Thus, the degree is 0.

Q.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) $7x^3$

***Sol.* (i)** In given expression, the highest degree of polynomial $x^2 + x$ is 2. So, it is a quadratic polynomial.

(ii) In given expression, the highest degree of polynomial $x - x^3$ is 3. So, it is a cubic polynomial.

(iii) In given expression, the highest degree of polynomial $y + y^2 + 4$ is 2. So, it is a quadratic polynomial.

(iv) In given expression, the highest degree of polynomial $(1 + x)$ is 1. So, it is a linear polynomial.

(v) In given expression, the highest degree of polynomial $3t$ is 1. So, it is a linear polynomial.

(vi) In given expression, the highest degree of polynomial r^2 is 2. So, it is a quadratic polynomial.

(vii) In given expression, the highest degree of polynomial $7x^3$ is 3. So, it is cubic polynomial.