EXERCISE 2.1

1. Which of the following expressions are polynomials?

(*i*) $\frac{1}{x^{-2}}+\frac{1}{x^{-1}}+\frac{1}{2}$ (*ii*) $x^2(x-1)$

(*iii*) $\frac{1}{x}(x-1)(x-2)$ (*iv*) $\frac{(x^2+x+1)(x+1)}{(1+x)}$

(*v*) $\frac{1}{8}(x^2+4x+6)$ (*vi*) $x^2+\frac{1}{x^2}$

(*vii*) $6+x^4+2x+3x^2$ (*viii*) $\sqrt{5}x^2+\sqrt{3}x+\sqrt{2}$

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

(*i*) $4+2x^2+3x$ (*ii*) $6-2x^2+3x^3+x^4$

(*iii*) πx^2-x+2 (*iv*) $\sqrt{3}x-4$.

3. Rewrite the following polynomials in the standard form:

(*i*) $x-7+8x^2+9x^3$

(*ii*) $-5x^2+6-3x^3+4x$

(*iii*) $-4+6x^3-x+7x^4-\sqrt{2}x^2$

(*iv*) $y^2+5y^3-11-7y+9y^4$

4. Which of the following are monomials, binomials or trinomials?

(*i*) 1 (*ii*) 2

(*iii*) $x^3+x-x+2$ (*iv*) $x^3+2x+x+3$

(*v*) x^5+6x^4 (*vi*) $\frac{x^6}{4}+\frac{x^5}{5}+\frac{x^4}{4}$

Find the degree of each of the following polynomials :

5. $1-2x+x^6$ **6.** $\frac{x^3+x^4-x^6}{x^2}$

7. $x^3(x^4+1)$ **8.** $5x^4-\frac{8x^3}{3}+\frac{4x^2}{7}+3x-\frac{5}{2}$

9. $\frac{x^4}{4}-x^3+2\sqrt{2}x+3$ **10.** $a^2x^4+ax^2+x+1$

11. $\frac{1}{x^2}(x^3-x^4+x^8)$

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

(*i*) $3x$ (*ii*) y^2 (*iii*) $4x^3$

(*iv*) $1+t$ (*v*) $x+x^2+5$ (*vi*) $x-x^3$

(*vii*) x^2+x

IX Homework-4 (solutions)

1) Which of the following expressions are polynomials?

(i) $\frac{1}{x^{-2}} + \frac{1}{x^{-1}} + \frac{1}{2}$

$x^2 + x + \frac{1}{2}$, yes it is a polynomial since the powers of variable x are non-negative integers.

(ii) $x^2(x-1)$

$x^3 - x^2$, yes it is a polynomial since the powers of variable x are non-negative integers.

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

$\frac{1}{x}(x^2 - 2x - x + 2) = \frac{x^2 - 3x + 2}{x} = \frac{x^2}{x} - \frac{3x}{x} + \frac{2}{x}$

$= x - 3 + 2x^{-1}$, No it is not a polynomial since the powers of variable x are not non-negative integers.

(iv) $\frac{(x^2+x+1)(x+1)}{1+x} = x^2 + x + 1$, yes it is a polynomial since the powers of variable x are non-negative integers.

(v) $\frac{1}{8}(x^2 + 4x + 6) = \frac{x^2}{8} + \frac{4x}{8} + \frac{6}{8} = \frac{x^2}{8} + \frac{x}{2} + \frac{3}{4}$, yes it is a polynomial since the powers of variable x are non-negative integers.

(vi) $x^2 + \frac{1}{x^2}$ $= x^2 + x^{-2}$, No it is not a polynomial since the powers of variable x are not non-negative integers.

(vii) $6+x^4+2x+3x^2$ – Yes, it is a polynomial since the powers of variable x are non-negative integers.

(viii) $\sqrt{5}x^2+\sqrt{3}x+\sqrt{2}$ – Yes it is a polynomial since the powers of variable x are non-negative integers.

2) Write the coefficient of x^2

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

The coefficient of x^2 is 2

(ii) $6-2x^2+3x^3+x^4$

The coefficient of x^2 is -2

(iii) πx^2-x+2

The coefficient of x^2 is π

(iv) $\sqrt{3}x-4 = 0x^2+\sqrt{3}x-4$

The coefficient of x^2 is 0

3) Rewrite the following polynomials in the standard form:

(i) $x-7+8x^2+9x^3$

$9x^3+8x^2+x-7$

(ii) $-5x^2+6-3x^3+4x$

$-3x^3-5x^2+4x+6$

(iii) $-4+6x^3-x+7x^4-\sqrt{2}x^2$

$7x^4+6x^3-\sqrt{2}x^2-x-4$

(iv) $y^2+5y^3-11-7y+9y^4$

$9y^4+5y^3+y^2-7y-11$

4) Which of the following are monomials, binomials or trinomials?

(i) 1 – monomial since it has only one term

(ii) 2 – monomial since it has only one term.

(iii) $x^3+x-x+2 = x^3+2$, binomial since it has 2 terms

(iv) $x^3+2x+x+3 = x^3+3x+3$, trinomial since it has 3 terms

(v) x^5+6x^4, binomial since it has two terms

(vi) $\frac{x^6}{4}+\frac{x^5}{5}+\frac{x^4}{4}$, trinomial since it has three terms.

5) Find the degree

(i) $1-2x+x^6$, degree = 6 since the highest power of the variable x is 6.

(ii) $\frac{x^3+x^4-x^6}{x^2} = \frac{x^3}{x^2}+\frac{x^4}{x^2}-\frac{x^6}{x^2} = x+x^2-x^4$, degree = 4

Since the highest power of the variable x is 4

(iii) $x^3(x^4+1) = x^7+x^3$, degree = 7 since the highest power of the variable x is 7.

(iv) $5x^4-\frac{8x^3}{3}+\frac{4x^2}{7}+3x-\frac{5}{2}$, degree = 4 since the highest power of the variable x is 4

(v) $\frac{x^4}{4}-x^3+2\sqrt{2}x+3$, degree = 4 since the highest power of the variable x is 4

(vi) $a^2x^4+ax^2+x+1$, degree = 4, since the highest power of the variable x is 4.

(vii) $\frac{1}{x^2}(x^3-x^4+x^8) = \frac{x^3}{x^2}-\frac{x^4}{x^2}+\frac{x^8}{x^2} = x-x^2+x^6$, degree = 6

Since the highest power of the variable x is 6.

6) Classify as linear, quadratic and Cubic Polynomials.

(i) $3x$, linear polynomial since degree is 1

(ii) y^2, quadratic polynomial since degree is 2

(iii) $4x^3$, Cubic polynomial since degree is 3.

(iv) $1+t$, linear polynomial since degree is 1

(v) $x+x^2+5$, quadratic polynomial since degree is 2

(vi) $x-x^3$, Cubic polynomial since degree is 3

(vii) x^2+x, quadratic polynomial since degree is 2.