

Topic: Polynomials and Partial Fractions

- 1 Factorise completely $27x^3 - (x-1)^3$. [2]

- 2 (i) Given that $f(x) = 2x^3 + ax^2 + bx - 9$, find the value of a and of b if $f(x)$ is exactly divisible by $x - 3$ and leaves a remainder of 8 when divided by $x + 1$. [5]
 (ii) Hence, factorise $f(x)$ completely. [3]

- 3 (i) Given that $f(x) = 2x^3 + 3x^2 - 18x + 8$, factorise $f(x)$ completely. [4]
 (ii) Hence solve the equation $2(x-1)^3 + 3(x-1)^2 - 18(x-1) + 8 = 0$ [2]

- 4 Given that $x^5 + ax^3 + bx^2 - 3 = (x^2 - 1)Q(x) - x - 2$, where $Q(x)$ is a polynomial.
 (i) State the degree of $Q(x)$. [1]
 (ii) Find the value of a and of b . [4]
 (iii) Using the value of a and of b found in part (ii), find the remainder when $x^5 + ax^3 + bx^2 - 3$ is divided by $x + 2$. [1]

- 5 Express $\frac{5-7x}{(x+2)(x-2)}$ in partial fractions. [3]

- 6 Express $\frac{-3x^2 + 7x + 6}{x^3 + 2x^2}$ in partial fractions. [5]

Answer Key

1	$(2x+1)(13x^2-5x+1)$
2(i)	$a=1, b=-18$
2(ii)	$(x-3)(x+3)(2x+1)$
3(i)	$(x-2)(2x-1)(x+4)$
3(ii)	$x=3, \frac{3}{2}, -3$
4(i)	3
4(ii)	$a=-2, b=1$
4(iii)	-15
5	$\frac{-19}{4(x+2)} - \frac{9}{4(x-2)}$
6	$\frac{2}{x} + \frac{3}{x^2} - \frac{5}{x+2}$