

## Topical Revision Paper 4

### Term 2 Unit 4: Polynomials

#### Question 1:

It is given that  $f(x) = (x+3)(2x-1)g(x) + mx + c$ , where  $f(x)$  and  $g(x)$  are polynomials in terms of  $x$ , and  $m$  and  $c$  are constants.

The polynomial  $f(x)$  has a remainder of  $-11$  when divided by  $(x+3)$ , and a remainder of  $-4$  when divided by  $(2x-1)$ .

- (i) Find the value of  $m$  and of  $c$ . [4]  
(ii) Hence, find the remainder when  $f(x)$  is divided by  $2x^2 + 5x - 3$ . [1]

**Answer:** (i)  $m = 2$ ,  $c = -5$  (ii) Remainder is  $2x - 5$

#### Question 2:

- (i) Factorise  $x^3 - 5x^2 + 3x + 9$  completely. [4]  
(ii) Hence, solve the equation  $8x^6 = 20x^4 - 6x^2 - 9$ . [3]

**Answer:** (i)  $f(x) = (x+1)(x-3)^2$  (ii)  $x = \pm \frac{\sqrt{6}}{2}$  or  $x = \pm 1.22$

#### Question 3:

The polynomial  $P$  is given by  $P(x) = 2x^3 + 7x^2 - 6x + 1$ .

- (i) Verify that  $x = \frac{1}{2}$  is a root of the equation  $P(x) = 0$ . [1]  
(ii) Express  $P(x)$  in the form  $(2x-1)(Ax^2 + Bx + C)$  where  $A$ ,  $B$  and  $C$  are constants to be determined. [2]  
(iii) Find the remaining roots of  $P(x) = 0$  using completing square method, expressing your answer in exact form. [3]  
(iv) Hence solve the equation  $2 + 7e^x - 6e^{2x} + e^{3x} = 0$ . [3]

**Answer :** (ii)  $A = 1$ ,  $C = -1$ ,  $B = 4$  (iii)  $x = -2 - \sqrt{5}$  or  $x = -2 + \sqrt{5}$   
(iv)  $x = \ln 2, 1.44$  or  $x = 0.693, 1.44$

**Question 4:**

Using **long division**, find the quotient when  $12x^3 + 8x^2 + x - 2$  is divided by  $(2x+1)^2$ .

[3]

**Answer :** Quotient =  $3x-1$

**Question 5:**

(i) Find the values of  $p$  and  $q$  for which  $x^2 - x - 6$  is a factor of  $2x^3 + px^2 - 17x + q$ .  
[4]

(ii) Using the values of  $p$  and  $q$  found in part (i), solve the equation  
 $2x^3 + px^2 - 17x + q = 0$ .  
[3]

(iii) Hence, sketch the graph of  $y = 2x^3 + px^2 - 17x + q$ .  
[3]

**Answer :**

(i)  $p = 3$  and  $q = -30$  (ii)  $x = 3, x = -2$  or  $x = -2.5$