1 (b) Expand and simplify $(x - 3)(2x + 3)(4x + 5)$

$(x-3)(2x+3)(4x+5)$

$= (2x^2 - 3x - 9)(4x + 5)$ (1)

$= 8x^3 + 10x^2 - 12x^2 - 15x - 36x - 45$ (1)

$= 8x^3 - 2x^2 - 51x - 45$ (1)

$8x^3 - 2x^2 - 51x - 45$

(3)

(Total for Question 1 is 3 marks)

2 (b) Show that $(m + 4)(2m - 5)(3m + 1)$ can be written in the form $am^3 + bm^2 + cm + d$ where a, b, c and d are integers.

$(m+4)(2m-5)(3m+1)$

consider $(2m-5)(3m+1)$

$= 6m^2 + 2m - 15m - 5$

$= 6m^2 - 13m - 5$ (1)

$(m+4)(6m^2-13m-5)$

$= 6m^3 - 13m^2 - 5m + 24m^2 - 52m - 20$ (1)

$= 6m^3 + 11m^2 - 57m - 20$ (1)

(3)

(Total for Question 2 is 3 marks)

3 (b) Expand and simplify $(x + 2)(x - 3)(x + 4)$

consider

$(x-3)(x+4)$

$= x^2 + 4x - 3x - 12$

$= x^2 + x - 12$ (1)

$(x+2)(x^2+x-12)$

$= x^3 + 2x^2 + x^2 + 2x - 12x - 24$ (1)

$= x^3 + 3x^2 - 10x - 24$

(1)

$x^3 + 3x^2 - 10x - 24$

(3)

(Total for Question 3 is 3 marks)

4 Show that $(x - 1)(x + 3)(x - 5)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are integers.

Finding products of $(x-1)$ and $(x+3)$ first :

$(x-1)(x+3) = x^2 + 3x - x - 3$ (1)

$= x^2 + 2x - 3$

Finding products of (x^2+2x-3) and $(x-5)$:

$(x^2+2x-3)(x-5) = x^3 - 5x^2 + 2x^2 - 10x - 3x + 15$ (1)

$= x^3 - 3x^2 - 13x + 15$ (1)

(Total for Question 4 is 3 marks)