Higher Maths
SQA 2018 Paper 2
Question 7

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(a) (i) Show that $(x-2)$ is a factor of $2x^3-3x^2-3x+2$. **2**

(ii) Hence, factorise $2x^3-3x^2-3x+2$ fully. **2**

The fifth term, u_5, of a sequence is $u_5 = 2a-3$.

The terms of the sequence satisfy the recurrence relation $u_{n+1} = au_n - 1$.

(b) Show that $u_7 = 2a^3-3a^2-a-1$. **1**

For this sequence, it is known that

- $u_7 = u_5$
- a limit exists.

(c) (i) Determine the value of a. **3**

(ii) Calculate the limit. **1**

Answers:

(a) (i) Use 2 in synthetic division or in evaluation of cubic.
Show that the remainder upon division by $(x-2)$ is 0.

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

(b) Use the recurrence relation to obtain u_6 and then u_7.

(c) (i) $\frac{1}{2}$

(ii) -2