

3.4 Answers

GCSE Mathematics Iteration

3.4.1 Solution to 3.1 Table

n	U_n	U_{n+1}
1	U_1	$U_{1+1} = U_2$
2	U_2	U_3
3	U_3	U_4
...	...	...
8	U_8	U_9
...	...	...
43	U_{43}	U_{44}

[3 marks]

3.4.2 Solution to 3.2 Example

3.2 Example

$$U_1 = 0 \quad U_{n+1} = 3U_n + 1$$

U_1	U_2	U_3	U_4	U_5	U_6	U_7
0	1	4	13	40	121	364

[4 marks]

3.4.3 Solutions to 3.3 Exercise

Answer 1

$$A_1 = 2 \quad A_{n+1} = 2A_n - 1$$

A_1	A_2	A_3	A_4	A_5	A_6	A_7
2	3	5	9	17	33	65

[4 marks]

Answer 2

$$H_1 = 11 \quad H_{n+1} = 2H_n - 10$$

H_1	H_2	H_3	H_4	H_5	H_6	H_7	H_8
11	12	14	18	26	42	74	138

[4 marks]

Answer 3

$$P_1 = 5 \quad P_{n+1} = 2 P_n - 3$$

(i)

P_1	P_2	P_3	P_4	P_5	P_6
5	7	11	19	35	67

[4 marks]

- (ii) The professor is not correct because 35 is not prime.
The factors of 35 are {1, 5, 7, 35} and a prime has exactly two factors.
Give a reason for your answer.

[2 marks]

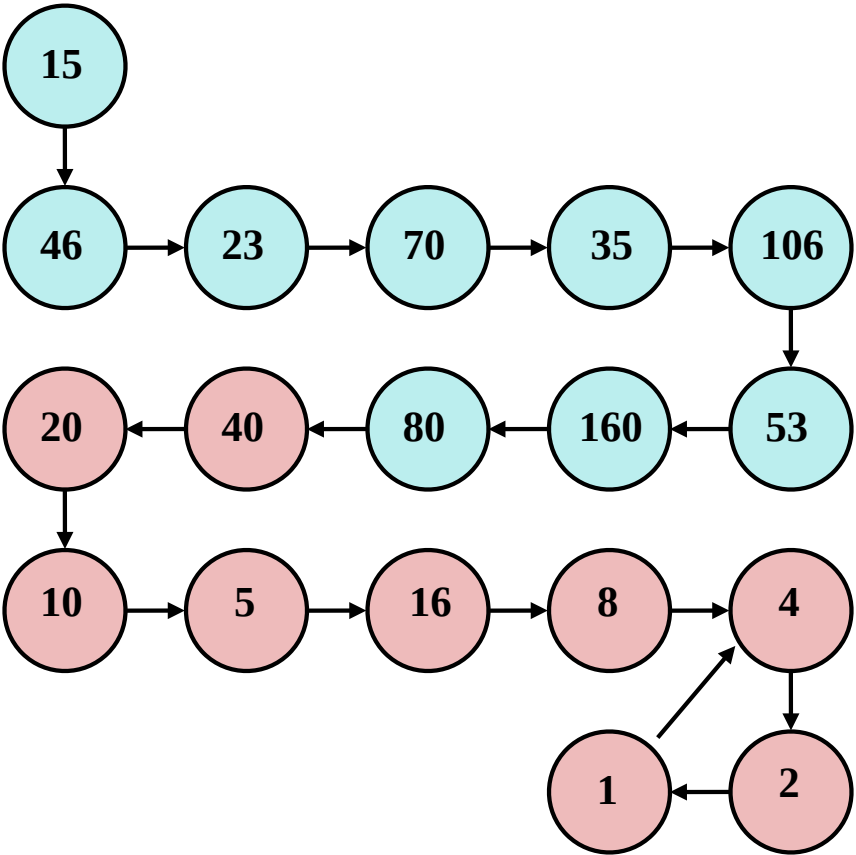
Answer 4

$$B_1 = 10 \quad B_{n+1} = 3 B_n - 10$$

B_1	B_2	B_3	B_4	B_5	B_6	B_7
10	20	50	140	410	1220	3650

[4 marks]

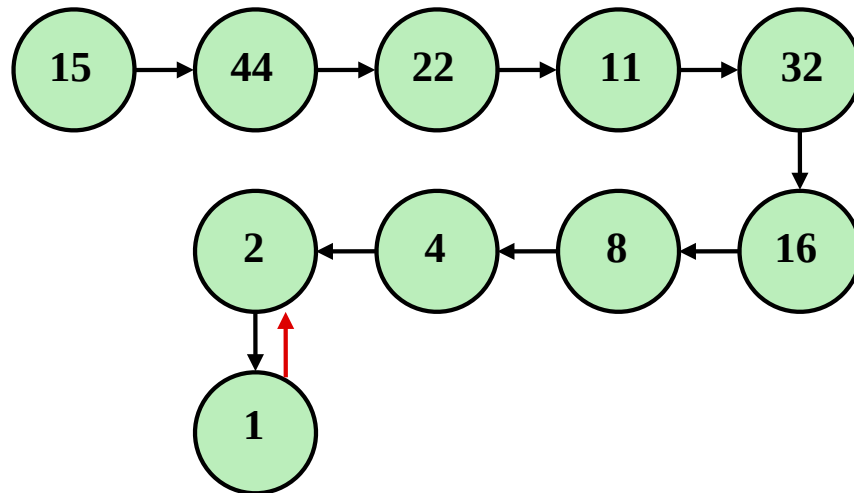
Answer 5



[6 marks]

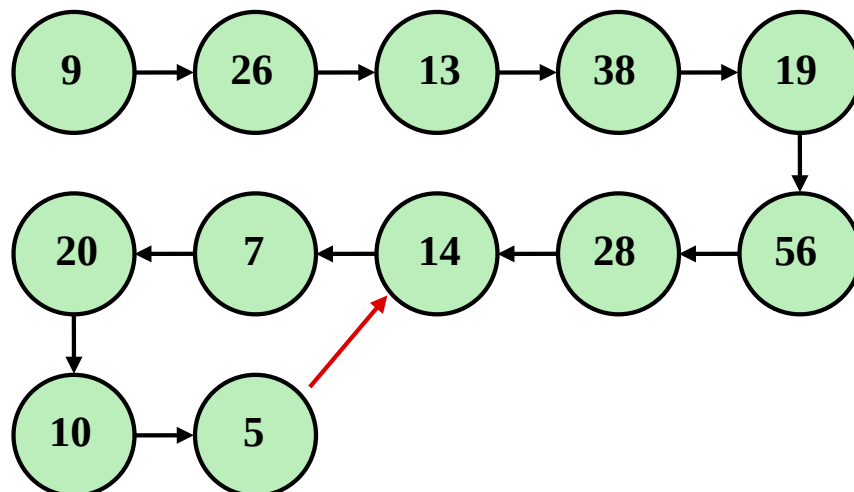
Answer 6

(i)



[6 marks]

(ii)



[6 marks]

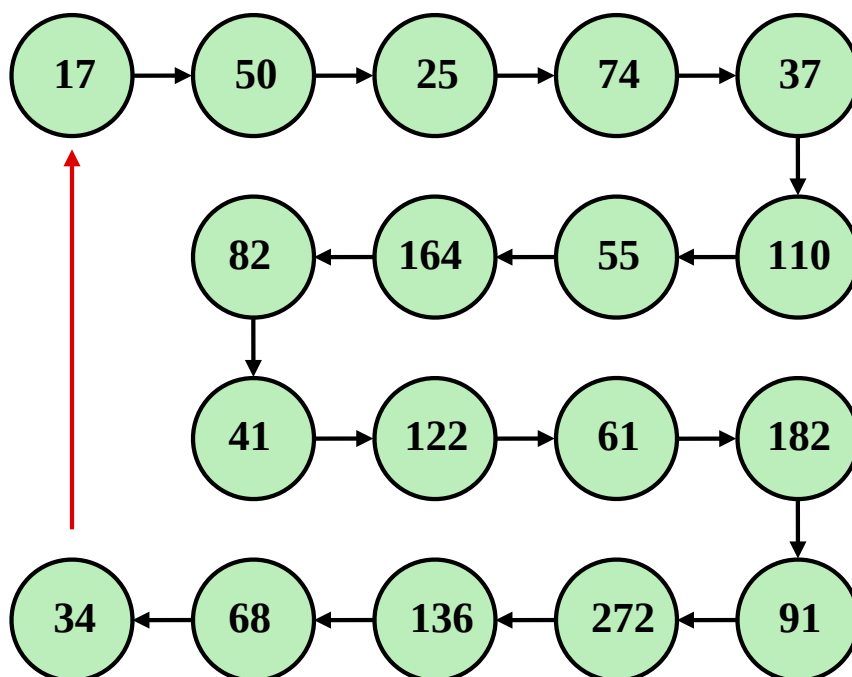
(iii) See the red arrow in the part (ii) answer, above.

[1 mark]

(iv) The part (ii) and (iii) answers show that for this adjusted function to Collatz conjecture is FALSE because the sequence has gone into an endless loop around the numbers 14, 7, 20, 10, and 5 and so does not ever get to the number 1

[2 marks]

(v)



[10 marks]

(vi) See the red arrow in the part (ii) answer, above.

[1 mark]