

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Quiz 5 Median 9/10

- 1) Let  $g$  be the function given by

$$g(n) = \begin{cases} \frac{n}{2} & \text{if } n \text{ is even} \\ \frac{3n+1}{2} & \text{if } n \text{ is odd} \end{cases}$$

Show that for positive integer  $n = 8$ , starting from  $n$  and iterating  $g$ , the function value eventually returns to 1.

$$8 \rightarrow 4 \rightarrow 2 \rightarrow 1$$

- 2) Compute  $-950 + 857$  using 2's complement addition. Use 12 bits for your word size. Note the 950 is 3B6 in hexadecimal and positive 857 is 359 in hexadecimal. Show your work and check your answer.

$$\begin{array}{r} 1100\ 0100\ 1010 \quad (\text{write down } 3B6_{16} \text{ in binary, copy up to and including first 1, invert the rest}) \\ + \quad 0011\ 0101\ 1001 \\ \hline 1111\ 1010\ 0011 \end{array}$$

(read by applying 2's complement –copy up to and including first 1, invert the rest)

which reads as negative **0000 0101 1101**

$$\Rightarrow \text{negative } 1 \times 2^6 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^0 = 64 + 16 + 8 + 4 + 1 = -93 \checkmark$$