PART 1

1. The data assimilation step aims to correct

1. The model error
2. The initial condition error
3. Bor both of the above \*

2. The Lorenz96 model, used as a benchmark, is said to be “chaotic” because:

1. It is unpredictable
2. It contains non-derivative functions
3. It is non-physical
4. It is very sensitive to initial conditions \*

3. In the standard setup what is the approximate value of the root mean square error (RMSE) of the analysis (at 10-2 precision)?

1. 0.20
2. 50
3. 2.71
4. 0.14

4. If you change the observation error standard deviation to 𝜎obs= 0.1 (instead of the standard value of 0.1), what is the approximate value of the root mean square error of the analysis (analysis RMSE , at 10-2 precision)?

1. 0.20
2. 0.10
3. 2.71
4. 0.14 \*

PART 2

5. In the standard configuration, how many parameters are optimised in the neural network?

1. 80
2. 5000
3. 4783 \*
4. 500

6. In the standard configuration, what is the approximate value of the correlation (R2) computed on the validation set (at 10-2 precision)?

1. 0.80
2. 1.00
3. 0.18 \*
4. 0.20

7. Change the neural network to have only one internal layer containing 5 units with a kernel size of 7 and a ‘tanh’ activation function. Run the whole training process again. What is then the approximate value of the correlation (R2) computed on the validation set (at 10-2 precision)?

1. 0.80
2. 0.20
3. 0.18
4. 0.14 \*

PART 3

8. What is the forecast lead time below which the hybrid model has a significant lower error than the physical model?

1. 3.5 MTU
2. 10.0 MTU
3. By construction, the hybrid model is expected to always have a lower error.