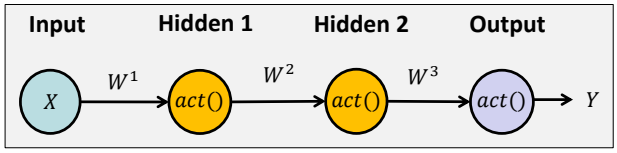
1) Which equation gives the output of the network shown below:



- ☒ $Y = act(W^3 \times act(W^2 \times act(W^1 \times X)))$
- ☐ $Y = act(W^1 \times act(W^2 \times act(W^3 \times X)))$
- ☐ $Y = act(W^3) + act(W^2) + act(W^1) + X$
- ☐ $Y = act(W^3) \times act(W^2) \times act(W^1) \times X$

2) Gradient Descent learning is based on the derivative of the which two factors:

- ☐ Output and Error
- ☒ Weight and Error
- ☐ Input and Error
- ☐ Input and Output

3) How is this derivative used to minimise the error?

- ☒ The weights are adjusted in the opposite direction of the derivative
- ☐ The weights are adjusted in the same direction of the derivative
- ☐ The weights are adjusted according to the inverse of the derivative
- ☐ The weights are adjusted according to the square of the derivative

4) Which of the following equations shows the concept for one step of a gradient-based training algorithm using the learning rate α, the trainable parameters $\boldsymbol{\theta}_t$ of at different time steps t and the gradient $\nabla_{\boldsymbol{\theta}_t}$:

- ☐ $\boldsymbol{\theta}_{t+1} = -\alpha \nabla_{\boldsymbol{\theta}_t}$.
- ☐ $\boldsymbol{\theta}_{t+1} = \alpha \boldsymbol{\theta}_t - . \nabla_{\boldsymbol{\theta}_t}$
- ☐ $\boldsymbol{\theta}_{t+1} = -\alpha . \boldsymbol{\theta}_t \nabla_{\boldsymbol{\theta}_t}$
- ☒ $\boldsymbol{\theta}_{t+1} = \boldsymbol{\theta}_t - \alpha \nabla_{\boldsymbol{\theta}_t}$.

5) In gradient-based training, what is the role of the learning rate α?

- ☐ Helps minimise convergence effects when the input is small
- ☒ Helps minimise divergence effects when the input is large
- ☐ Helps maximise convergence effects when the input is small
- ☐ Helps maximise divergence effects when the input is large

6) The role of a *cost function* when training a deep learning model is to:

- ☒ Provide a score reflecting model performance
- ☐ Decrease the generalisation errors
- ☐ Determine the optimal complexity of the model
- ☐ Determine the adequate amount of training data

7) Stacked linear networks represent:

- ☐ Negates the need to induce correlation between the input and the output
- ☐ A highly effective regularisation technique
- ☐ A computationally inexpensive version of a single layer linear network
- ☒ A computationally expensive version of a single layer linear network

8) Which is the following is **not** a core property of an activation function

- ☐ Monotonic
- ☒ Discrete
- ☐ Nonlinear
- ☐ Computational Efficient

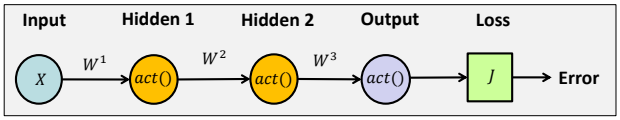
9) The *Sigmoid* and *Hyperbolic Tangent* activation functions:

- ☐ Both have a range of 0 to 1
- ☐ Both have a range of -1 to 1
- ☒ Have a range of 0 to 1 and -1 to 1 respectively
- ☐ Have a range of -1 to 1 and 0 to 1 respectively

10) Which of the following mathematical operations is characteristic for backpropagation?

- ☐ Polynomial interpolation.
- ☒ Chain rule of derivation.
- ☐ Integration by substitution.
- ☐ Higher order derivatives.

11) Which equation gives the gradient with respect to W^1 in the network shown below?



- ☐ $\frac{\partial Error}{\partial W^1} = \frac{\partial Error}{\partial X} \times \frac{\partial X}{\partial W^1}$
- ☐ $\frac{\partial Error}{\partial W^1} = \frac{\partial Error}{\partial Output} + \frac{\partial Output}{\partial W^1}$
- ☐ $\frac{\partial Error}{\partial W^1} = \frac{\partial Error}{\partial Output} + \frac{\partial Output}{\partial hidden2} + \frac{\partial hidden2}{\partial hidden1} + \frac{\partial hidden1}{\partial W^1}$
- ☒ $\frac{\partial Error}{\partial W^1} = \frac{\partial Error}{\partial Output} \times \frac{\partial Output}{\partial hidden2} \times \frac{\partial hidden2}{\partial hidden1} \times \frac{\partial hidden1}{\partial W^1}$

12) In weighted-based regularisation, what is the main **advantage** in ensure smaller weights?

- ☐ Reduce bias errors
- ☒ Reduce the complexity of the model
- ☐ Improve training speed
- ☐ Reduce both bias and variance errors

13) What is the main **disadvantage** of *data augmentation* as a regularisation strategy?

- ☐ Increased training time
- ☐ Larger mini-batch size
- ☐ Increased model complexity
- ☒ Applying cross-class transformation

14) Which of the following properties makes a signal **less** suitable for analysis with a CNN

- ☐ Similar patterns appear in different regions of the signal
- ☒ The signal is sequential (time-dependent) in nature
- ☐ Key patterns can be much smaller than the whole signal
- ☐ Downsampling the signal does not change the key properties

15) The output of a convolutional kernel is found by doing which operation on the input signal:

- ☒ Dot product
- ☐ Conventional Convolution
- ☐ Flipped Convolution
- ☐ Fully connected summation

16) How many learnable parameters are associated with a max pooling layer?

- ☒ Zero
- ☐ One, the size of the pooling field
- ☐ Two, the size of the pooling field and the stride
- ☐ The same as size of the pooling field

17) What is the role of the forget gate in a *Long Short-Term Memory* (LSTM) cell is to:

- ☐ Reset the previous hidden state value
- ☒ Determine what old information should be thrown away or kept
- ☐ Determine what old information to throw away and what new information to add
- ☐ Learn when to forget all information and reset weights to identity matrix

18) Which of the following statements is **true**:

- ☐ GRU and LSTM networks never overfit
- ☐ LSTM cells are less likely to overfit than GRUs
- ☐ GRU and LSTM networks are equally as likely to overfit
- ☒ GRUs are less likely to overfit than LSTM cells

19) What is the disadvantage of conventional sequence-to-sequence modelling

- ☐ They can only be used in combination with LSTM networks
- ☐ Only the final decoder state is used to initialise the encoder
- ☒ Only the final encoder state is used to initialise the decoder
- ☐ The context vector increases the number of learnable parameters

20) Which of the following options uses exploration as a learning strategy in a reward-based environment?

- ☐ Supervised Learning
- ☒ Reinforcement Learning
- ☐ Unsupervised Learning
- ☐ Semi-Supervised Learning