

# Scalable Machine Learning and Deep Learning - Review Questions 5

**Deadline: December 6, 2020**

1. **1 point.** Assume we have a stacked autoencoder with three hidden layers  $\mathbf{h}_1$ ,  $\mathbf{h}_2$ , and  $\mathbf{h}_3$ , in which each layer applies the following functions respectively,  $\mathbf{h}_1 = \mathbf{f}_1(\mathbf{x})$ ,  $\mathbf{h}_2 = \mathbf{f}_2(\mathbf{h}_1)$ , and  $\mathbf{h}_3 = \mathbf{f}_3(\mathbf{h}_2)$ , and the output of the network will be  $\mathbf{y} = \mathbf{f}_4(\mathbf{h}_3)$ . Do you think if it is a good autoencoder if it generates  $\mathbf{f}_4(\mathbf{f}_3(\mathbf{f}_2(\mathbf{f}_1(\mathbf{x})))) = \mathbf{x}$  for all input instances  $\mathbf{x}$ . How can we improve it?

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2. **1 point.** How does Gibbs sampling work? When do we need to use Gibbs sampling?

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3. **1 point.** How do you tie weights in a stacked autoencoder? What is the point of doing so?

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4. **1 point.** What are minibatch standard deviation layers? Why will they help training GANs?

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5. **1 point.** What is Nash Equilibrium? How does it relate to GANs?