Homework 2 : linear regression

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| Student id: |  | Name: |  |

1. **Plot the training loss with different learning rates in linear model.**

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| **1. learning rate = 0.3** | **2. learning rate = 0.03** |
| (picture 1) | (picture 2) |
| **3. learning rate = 0.003** | **4. learning rate = 0.0003** |
| (picture 3) | (picture 4) |

**Corresponding to the above question, What’s the difference between big and small learning rate in the training?**

Ans:

1. **Plot the error surface (axis x for w1, axis y for for w2, axis z for loss)**

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| (picture 5) |

### Design five input nodes and one output node linear model and plot the training loss. (train on train\_X1 and train\_y1)

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| (picture 6) |
| **Training loss:** |

### Design ten input nodes and five output nodes linear model and plot the training loss. (train on train\_X2 and train\_y2)

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| (picture 7) |
| **Training loss:** |

1. **Design one hundred input nodes and one output node non linear model and record the training loss and testing loss in different power.(train on train\_X3 and train\_y3)**

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| **Power** | **1** | **10** | **100** | **1000** |
| **Training loss** |  |  |  |  |

**If we convert model from linear to nonlinear(like ). Can we get the lower training loss?** **Is it the best strategy to solve problems with machine learning? Please explain why.**

Ans: