

# Week 2 Exercises

The questions below are due on Sunday September 17, 2017; 11:00:00 PM.

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- Videos
  - Week 2, Lecture 1 ([https://introml.mit.edu/lecture\\_videos/lec\\_week2.mp4](https://introml.mit.edu/lecture_videos/lec_week2.mp4))
- Class Notes for Week 2 ([https://introml.mit.edu/\\_STATIC\\_/fall17/exercises/ex02/Wk2\\_notes.pdf](https://introml.mit.edu/_STATIC_/fall17/exercises/ex02/Wk2_notes.pdf))
- Required Exercises

1) Consider the following features, for each one pick a what might be the best encoding for linear classification. The assumption is that there are other features in the data set.

The point of this question is to think about alternatives; there are many options, many not mentioned here.

Car make, e.g. Chevy, Ford, Toyota, VW, for predicting gas mileage (lo, hi).

4 unary features (one-hot): 1000, 0100, 0010, 0001

2) Consider the following, one-dimensional, data set. It is not linearly separable in its original form.

$\hat{x}(1) = -1, \hat{y}(1) = +1$   
 $\hat{x}(2) = 0, \hat{y}(2) = -1$   
 $\hat{x}(3) = 1, \hat{y}(3) = +1$

Which of these feature transformations leads to a separable problem?

1.  $\phi(x) = 0.5 * x$
2.  $\phi(x) = |x|$
3.  $\phi(x) = x^2$
4.  $\phi(x) = x^3$
5.  $\phi(x) = x^4$

Enter a Python list with a subset of the numbers 1, 2, 3, 4, 5.

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[2, 3, 5]
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