1. What types of Machine Learning, if any, best describe the following three scenarios:
   1. A coin classification system is created for a vending machine. The developers obtain exact coin specifications from the U.S. Mint and derive a statistical model of the size, weight, and denomination, which the vending machine then uses to classify coins.
   2. Instead of calling the U.S. Mint to obtain coin information, an algorithm is presented with a large set of labeled coins. The algorithm uses this data to infer decision boundaries which the vending machine then uses to classify its coins.
   3. A computer develops a strategy for playing Tic-Tac-Toe by playing repeatedly and adjusting its strategy by penalizing moves that eventually lead to losing.

a] (i) Supervised Learning, (ii) Unsupervised Learning, (iii) Reinforcement Learning

[b] (i) Supervised Learning, (ii) Not learning, (iii) Unsupervised Learning

[c] (i) Not learning, (ii) Reinforcement Learning, (iii) Supervised Learning

[d] (i) Not learning, (ii) Supervised Learning, (iii) Reinforcement Learning

[e] (i) Supervised Learning, (ii) Reinforcement Learning, (iii) Unsupervised Learning

Answer: D

1. Which of the following problems are best suited for Machine Learning?
   1. Classifying numbers into primes and non-primes.
   2. Detecting potential fraud in credit card charges.
   3. Determining the time, it would take a falling object to hit the ground.
   4. Determining the optimal cycle for traffic lights in a busy intersection.

[a] (ii) and (iv)

[b] (i) and (ii)

[c] (i), (ii), and (iii)

[d] (iii)

[e] (i) and (iii)

Answer: A

1. We have 2 opaque bags, each containing 2 balls. One bag has 2 black balls and the other has a black ball and a white ball. You pick a bag at random and then pick one of the balls in that bag at random. When you look at the ball, it is black. You now pick the second ball from that same bag. What is the probability that this ball is also black?

Answer: D

Here let the event of first black ball be F and the second black ball be S

Consider a sample of 10 marbles drawn from a bin containing red and green marbles. The probability that any marble we draw is red is µ = 0.55 (independently, with replacement). We address the probability of getting no red marbles (ν = 0) in the following cases:

1. We draw only one such sample. Compute the probability that ν = 0. The closest answer is (‘closest answer’ means: |your answer−given option| is closest to 0):

Answer: B

P(v = 0 for 1 marble) = 1 – P(getting a red marble) = 1 - 0.55 = 0.45

So, P(v = 0 for 10 marbles) = 0.4510 = 3.405 \* 10-4

1. We draw 1,000 independent samples. Compute the probability that (at least) one of the samples has ν = 0. The closest answer is:

Answer: C

P(at least one has v = 0) = 1 – P(none of the 100 samples has v = 0)

= 1 – [1 - P(v = 0 for 1 marble)]1000

= 1 – (1 - 3.405 \* 10-4)1000

= 1 – 0.71136880215019

= 0.28863

1. Which hypothesis g agrees the most with the possible target functions in terms of the above score?

Answer: E

1. B
2. C
3. B
4. B