

NAME: NEPTUN CODE:

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Probability Theory 1st midterm make-up, 10th December 2021.

Working time: 45 minutes. Only simple, non-programmable calculators are allowed.

Maximum score: 24 points, but we consider 20 points already as 100%.

1. In a French card deck of 52 cards there are 13 cards of each suit (hearts, spades, clubs, diamonds). We shuffle the deck and then draw 8 cards. What is the probability that
 - (a) we drew no diamonds? (3 points)
 - (b) we drew at least one card from each suit? (7 points)

2. The couple next door, Nicole and Richard, often bakes sponge cakes. More precisely, $\frac{3}{4}$ of the time it is Nicole, $\frac{1}{4}$ of the time it is Richard who bakes the sponge cake. They always cut the cake into 8 equal slices. On average, there are 5 raisins in a slice if Richard baked the cake, and there are 3 raisins in a slice if Nicole. They promised to give me half a cake tomorrow, which means 4 slices.
 - (a) What is the probability that there will be no raisins in the half cake I receive? (5 points)
 - (b) I received the half cake and unfortunately there were no raisins in the first slice. What is the probability that this cake is baked by Nicole? (5 points)

Bonus: In a certain University, they change to online education due to pandemics in each semester with probability $\frac{1}{3}$, independently of the previous semesters. They applied this protocol for the first time this semester. In expected value, how many semesters later will they apply this protocol and change to online education for the fifth time? (4 points)