Probability and Statistics of Pokémon

*Database source link:* [*https://www.kaggle.com/datasets/rounakbanik/pokemon*](https://www.kaggle.com/datasets/rounakbanik/pokemon)

1. [Set Notation] Your team of Pokémon have the types of Poison, Dark, Flying, Grass, Water, and Normal. Your brother’s team of Pokémon have the types of Psychic, Flying, Electric, Fire, Dragon, and Dark. Given the total available types are S = {Normal, Fire, Grass, Water, Electric, Ice, Fighting, Poison, Ground, Flying, Psychic, Bug, Rock, Ghost, Dark, Dragon, Steel, Fairy}…
   1. Q: What are the remaining available types?  
      A: Ice, Fighting, Ground, Bug, Rock, Ghost, Steel, Fairy
   2. Q: Which types are shared between you and your brother’s teams?  
      A: Flying, Dark
2. [Mean/Median] You have a team of Pokémon consisting of Watchog, Stoutland, Audino, Cinccino, and Bouffalant. These Pokémon weigh 27.0 kg, 61.0 kg, 31.0 kg, 7.5 kg, and 94.6 kg, respectively.
   1. Q: What is the average weight of your team?  
      A: 27.0 + 61.0 + 31.0 + 7.5 + 94.6 = 221.1 / 5 = 44.22 kg
   2. Q: Which Pokémon is the median of the team by weight?  
      A: In order by ascending weight, the team is: Cinccino (7.5 kg), Watchog (27.0 kg), Audino (31.0 kg), Stoutland (61.0 kg), and Bouffalant (94.6 kg). So, Audino is the median.
3. [Probability Introduction] You breed 3 Pokémon with a 50% chance of being female and 50% chance of being male.
   1. Q: What are the odds of hatching exactly 2 females?   
      A: Given these conditions, there will be 8 possible outcomes as follows:  
      E1: FFF E2: FFM E3: FMF E4: MFF  
      E5: FMM E6: MFM E7: MMF E8: MMM  
      Each outcome is equally likely, so they all have a probability of 1/8. E2, E3, and E4 each have exactly 2 females, so P(A) = P(E2) + P(E3) + P(E4) = 1/8 + 1/8 + 1/8 = 3/8
4. [Multinomial Coefficients] You and three of your friends begin your new Pokémon journey. You begin your journey by selecting a team of 6 Pokémon from the starting area.
   1. Q: Given 24 available Pokémon, how many distinct team configurations of 6 Pokémon can be created?
   2. A:
5. [Conditional Probability] You enter a new area and see 10 trainers to battle, 4 females and 6 males. 5 of these trainers use Bug type Pokémon, while the other 5 use Normal type Pokémon. 2 of the female trainers have healing items they can use during battle. To begin training, you decide to encounter one of these trainers at random, with each encounter being equally likely.
   1. Q: What is the probability that a randomly encountered trainer is female?  
      A: P(Female) = 4/10 = 2/5
   2. Q: What is the probability that a randomly encountered trainer uses Bug type Pokémon?  
      A: P(Bug) = 5/10 = 1/2
   3. Q: What is the probability that a randomly encountered trainer is female and has a healing item?   
      A: P(Female ∩ Healing) = 2/10 = 1/5
   4. Q: If the randomly encountered trainer is female and has a healing item, what is the probability the trainer uses Bug type Pokémon?  
      A: P(Bug | Female)