

Practice Class 1: Direct Enumeration – Answers

Q1: Hint: Partition the problem on squared distance from origin. Answer: 21.

Q2: Hint: Partition according to the value of $a \in \{1, 2, \dots, 100\}$.

Use that $\sum_{k=1}^n k^2 = \frac{1}{6}n(n+1)(2n+1)$. Answer: $\frac{1}{6}99 \cdot 100 \cdot 199$.

Q3: There are 18 possible rolls of two dice with an even sum. Hence the probability is $1/2$.

Q4: There are $36^8 - 26^8$ passwords containing at least one digit.

Q5: Answers: (a) 7^5 . (b) $(7)_5 = 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3$. (c) $7 \cdot 6^4$. (d) $462 = \binom{5+7-1}{5}$.

Q6: Let n be the number of digits in the bit string. There are $2^{n/2}$ palindromes when n is even and $2^{(n+1)/2}$ when n is odd (can be expressed as $2^{\lceil n/2 \rceil}$ for any n).

Q7: Hint: Place a blue car between each red card then park remaining blue cars. Answer: 15.

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