

Problems

- (1) You are organizing a new basketball league, and 50 people want to participate. How many distinct ways can you divide these 50 people into 10 teams with 5 players each?
- (2) Suppose that each of N small objects is randomly placed into one of M large containers. If $N \leq M$, what is the probability that each object is placed into a distinct container? But if $N \geq M$, what is the probability that every container receives at least one object?

- (3) Evaluate:

$$\lim_{x \rightarrow \infty} (\sqrt{x^2 + x} - x).$$

- (4) Evaluate:

$$\cos\left(\frac{n\pi}{3}\right) + \frac{1}{\sqrt{3}} \sin\left(\frac{n\pi}{3}\right) \quad \text{for all integers } n.$$

- (5) Draw six line segments through these 16 points, which are arranged in a grid. Do not lift your pencil from start to finish.



