



HÁSKÓLINN Í REYKJAVÍK
REYKJAVÍK UNIVERSITY

Vorönn 2017

Strjál stærðfræði II
T-419-STR2

Skiladæmi: Lítil skil 5

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Hópur : Fjarnám

Dæmatímakennari:

KHR 6.4

4: Find the coefficient of x^5y^8 in $(x + y)^{13}$.

$$\binom{13}{8} = \frac{13!}{5!8!} = 1287$$

8: What is the coefficient of x^8y^9 in the expansion of $(3x + 2y)^{17}$?

$$\binom{17}{9} 2^8 3^9 = \frac{17!}{9!8!} 2^8 3^9 = 122494394880$$

12: The row of Pascal's triangle containing the binomial coefficients $\binom{10}{k}$, $0 \leq k \leq 10$, is:

$$1 \ 10 \ 45 \ 120 \ 210 \ 252 \ 210 \ 120 \ 45 \ 10 \ 1$$

Use Pascal's identity to produce the row immediately following this row in Pascal's triangle.

Using Pascal's identity $\binom{n}{k} + \binom{n}{k+1} = \binom{n+1}{k+1}$ and the identities $\binom{n}{0} = \binom{n}{n} = 1$, we obtain the row $\binom{11}{0}\binom{11}{1}\dots\binom{11}{9}\binom{11}{10}\binom{11}{11}$ from the given row: 1 11 55 165 330 462 462 330 165 55 11 1.

KHR 6.5

10: A croissant shop has plain croissants, cherry croissants, chocolate croissants, almond croissants, apple croissants, and broccoli croissants. How many ways are there to choose:

a) a dozen croissants?

$$\binom{12+6-1}{12} = \frac{17!}{12!5!} = 6188$$

b) three dozen croissants?

$$\binom{36+6-1}{36} = \frac{41!}{36!5!} = 749398$$

c) two dozen croissants with at least two of each kind?

$$\text{Buy two of each, then 12 more: } \binom{12+6-1}{12} = \frac{17!}{12!5!} = 6188$$

22: How many ways are there to distribute 12 indistinguishable balls into six distinguishable bins?

$$n=12, r=6, \text{ so } \binom{12+6-1}{12} = \frac{17!}{12!5!} = 6188$$

30: How many different strings can be made from the letters in MISSISSIPPI, using all the letters?

$$M:1, I:4, S:4, P:2 = 11, \text{ so } \frac{11!}{1!2!4!4!} = 34650$$

42: In bridge, the 52 cards of a standard deck are dealt to four players. How many different ways are there to deal bridge hands to four players?

$$\text{Player 1: } \frac{52!}{13!39!}, \text{ Player 2: } \frac{39!}{13!26!}, \text{ Player 3: } \frac{26!}{13!13!}, \text{ Player 4: } \frac{13!}{13!0!}$$

$$\text{So } \frac{52!}{13!39!} + \frac{39!}{13!26!} + \frac{26!}{13!13!} + \frac{13!}{13!0!} = \frac{52!}{13!13!13!13!} = 53 \ 644 \ 737 \ 765 \ 488 \ 792 \ 839 \ 237 \ 440 \ 000$$