Çankaya University
Department of Computer Engineering

CENG 277 - Discrete Structures

Name-Surname: 04.12.2014

ID Number:

CLASSWORK 8

We will form 20 letter sequences using the letters $\{a, b, c, d\}$. Each letter will be used at least once. How many sequences are possible?

Answer:

Using exponential generating functions:

$$\left(x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots\right)^4$$

$$= (e^x - 1)^4$$

$$= e^{4x} - 4e^{3x} + 6e^{2x} - 4e^x + 1$$

Coefficient of $\frac{x^{20}}{20!}$ is:

$$4^{20} - 4 \cdot 3^{20} + 6 \cdot 2^{20} - 4$$

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CLASSWORK 8

We will form 30 letter sequences using the letters $\{a, b, c, d, e\}$. We will use b at least 3 times. How many sequences are possible?

Answer:

Using exponential generating functions:

$$\left(\frac{x^3}{3!} + \frac{x^4}{4!} + \cdots\right) e^{4x}$$

$$= \left(e^x - 1 - x - \frac{x^2}{2!}\right) e^{4x}$$

$$= e^{5x} - e^{4x} - xe^{4x} - \frac{x^2}{2!}e^{4x}$$

Coefficient of $\frac{x^{30}}{30!}$ is:

$$5^{30} - 4^{30} - 30 \cdot 4^{29} - 435 \cdot 4^{28}$$