Sample of MathML 1

Japanese High School Text "Mathematics B"

N-th power root

In general, a non-zero complex number, $a = r(\cos\theta + i\sin\theta)$, has the following n complex numbers as n-th power roots.

$$z_n = \sqrt[n]{r}\left\{\cos\left(\frac{\theta}{n} + \frac{360^\circ}{n} \times k\right) + i\sin\left(\frac{\theta}{n} + \frac{360^\circ}{n} \times k\right)\right\} (k = 0,\ 1,\ 2,\ \cdots,\ n-1),$$

where $\sqrt[n]{r}$ is a positive n-th power root of a positive number r.

An angle made by two vectors

Suppose two vectors $\overrightarrow{a} = (a_1,\ a_2)$ and $\overrightarrow{b} = (b_1,\ b_2)$ are non-zero vectors, θ is the angle made by these two vectors, and $0^\circ \leqq \theta \leqq 180^\circ$. Since $\overrightarrow{a} \cdot \overrightarrow{b} = \left|\overrightarrow{a}\right|\left|\overrightarrow{b}\right|\cos\theta$,

$$\cos\theta = \frac{\vec{a} \cdot \vec{b}}{\left|\vec{a}\right|\left|\vec{b}\right|} = \frac{a_1 b_1 + a_2 b_2}{\sqrt{{a_1}^2 + {a_2}^2}\sqrt{{b_1}^2 + {b_2}^2}}$$

A point that divides a segment into *m*:*n*

Suppose two points, A($\vec{a}$) and B($\vec{b}$), are not identical, $m + n \neq 0$, and a point, P($\vec{p}$), divides a segment AB into $m : n$. Then,

$$\vec{p} = \frac{n\vec{a} + m\vec{b}}{n + m}$$

Particularly, when the midpoint of a segment AB is M($\vec{m}$),

$$\vec{m} = \frac{\vec{a} + \vec{b}}{2}$$

Probability distribution

Suppose a random variable X can take the following n values x_1, x_2, ..., x_n, and the probability of an event $X = x_i$ is p_i. Then,

Mean $$m = E(X) = \sum_{i=1}^{n} x_i p_i$$

Variance $$V(X) = E((X - m)^2) = \sum_{i=1}^{n} (x_i - m)^2 p_i$$

$$V(X) = E(X^2) - m^2 = \sum_{i=1}^{n} x_i^2 p_i - m^2$$

Standard deviation $\sigma(X) = \sqrt{V(X)}$

Matrix Presentation

$$A = \begin{array}{c} \\ r\left[\\ s\left[\end{array} \begin{array}{c} \overbrace{\phantom{A_{11}}}^{m} \\ \left(\begin{array}{c|c} A_{11} & A_{12} \\ \cdots & \cdots \\ A_{21} & A_{22} \end{array} \right) \end{array} \begin{array}{c} \\ \overbrace{\phantom{A_{12}}}^{n} \\ \\ \end{array}$$