০৭ ম্যাট্রিক্স ও নির্ণায়ক
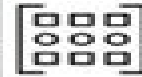## Matrices and Determinants

Board Questions Analysis

সৃজনশীল প্রশ্ন

বোর্ড সাল	ঢাকা	ময়মনসিংহ	রাজশাহী	কুমিল্লা	যশোর	চট্টগ্রাম	বরিশাল	সিলেট	দিনাজপুর
২০২৩	২	২	২	২	২	২	১	২	১
২০২২	২	১	২	১	২	২	১	২	১

বহুনির্বাচনি প্রশ্ন

বোর্ড সাল	ঢাকা	ময়মনসিংহ	রাজশাহী	কুমিল্লা	যশোর	চট্টগ্রাম	বরিশাল	সিলেট	দিনাজপুর
২০২৩	৫	৫	৪	৪	৭	৪	৫	৪	৫
২০২২	৩	৫	৪	৫	৪	৪	৪	৫	৪

বিগত সালে বোর্ডে আসা সৃজনশীল প্রশ্ন

১। দৃশ্যকল্প-১: $x + y + z = 1$ [ঢাকা বোর্ড '২৩]
$x + 2y + z = 2$
$x + y + 2z = 0$

দৃশ্যকল্প-২: $D = 8 \begin{vmatrix} \dfrac{p-q-r}{2} & p & p \\ q & \dfrac{q-r-p}{2} & q \\ r & r & \dfrac{r-p-q}{2} \end{vmatrix}$

(ক) $A = [1 \quad 2 \quad 3]$ এবং $B = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$ হলে, $(AB)'$ নির্ণয় কর।

(খ) দৃশ্যকল্প-১: এ উল্লিখিত সমীকরণ জোট নির্ণায়কের সাহায্যে সমাধান কর।

(গ) দৃশ্যকল্প-২: থেকে প্রমাণ কর যে, $D = S^3$, যেখানে $S = p + q + r$

সমাধান:

(ক) দেওয়া আছে, $A = [1 \quad 2 \quad 3]$ এবং $B = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}$

$\therefore AB = [1 \quad 2 \quad 3] \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} = [3 + 4 + 3] = [10]$

$\therefore (AB)' = [10]' = [10]$ (Ans.)

(খ) দেওয়া আছে, $x + y + z = 1$
$x + 2y + z = 2$
$x + y + 2z = 0$

x, y ও z এর সহগগুলো নিয়ে গঠিত নির্ণায়ক,

$D = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{vmatrix}$
$= 1(4-1) - 1(2-1) + 1(1-2)$
$= 1 \neq 0$

এখন, $D_x = \begin{vmatrix} 1 & 1 & 1 \\ 2 & 2 & 1 \\ 0 & 1 & 2 \end{vmatrix}$
$= 1(4-1) - 1(4-0) + 1(2-0)$
$= 1$

$D_y = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 0 & 2 \end{vmatrix}$
$= 1(4-0) - 1(2-1) + 1(0-2)$
$= 1$

$D_z = \begin{vmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 1 & 1 & 0 \end{vmatrix}$
$= 1(0-2) - 1(0-2) + 1(1-2)$
$= -1$

$\therefore x = \dfrac{D_x}{D} = \dfrac{1}{1} = 1$

$y = \dfrac{D_y}{D} = \dfrac{1}{1} = 1$

$z = \dfrac{D_z}{D} = \dfrac{-1}{1} = -1$

$\therefore$ নির্ণেয় সমাধান: $(x, y, z) = (1, 1, -1)$ (Ans.)

(গ) $D = 8 \begin{vmatrix} \dfrac{p-q-r}{2} & p & p \\ q & \dfrac{q-r-p}{2} & q \\ r & r & \dfrac{r-p-q}{2} \end{vmatrix}$

$= 8 \times \dfrac{1}{2} \times \dfrac{1}{2} \times \dfrac{1}{2} \begin{vmatrix} p-q-r & 2p & 2p \\ 2q & q-r-p & 2q \\ 2r & 2r & r-p-q \end{vmatrix}$

[প্রত্যেকটি সারিকে 2 দ্বারা গুণ করে।]

$= 8 \times \dfrac{1}{8} \begin{vmatrix} p+q+r & p+q+r & p+q+r \\ 2q & q-r-p & 2q \\ 2r & 2r & r-p-q \end{vmatrix}$

$[r_1' = r_1 + r_2 + r_3]$

Math Hsc Target Matrices

Nicola Bellomo,Carlo Bianca

Math Hsc Target Matrices:

Towards a Mathematical Theory of Complex Biological Systems Carlo Bianca,Concetta Bianca,N. Bellomo,2011 This monograph has the ambitious aim of developing a mathematical theory of complex biological systems with special attention to the phenomena of ageing degeneration and repair of biological tissues under individual self repair actions that may have good potential in medical therapy The approach to mathematically modeling biological systems needs to tackle the additional difficulties generated by the peculiarities of living matter These include the lack of invariance principles abilities to express strategies for individual fitness heterogeneous behaviors competition up to proliferative and or destructive actions mutations learning ability evolution and many others Applied mathematicians in the field of living systems especially biological systems will appreciate the special class of integro differential equations offered here for modeling at the molecular celular and tissue scales A unique perspective is also presented with a number of case studies in biological modeling **Towards A Mathematical Theory Of Complex Biological Systems** Nicola Bellomo,Carlo Bianca,2011-01-12 This monograph has the ambitious aim of developing a mathematical theory of complex biological systems with special attention to the phenomena of ageing degeneration and repair of biological tissues under individual self repair actions that may have good potential in medical therapy The approach to mathematically modeling biological systems needs to tackle the additional difficulties generated by the peculiarities of living matter These include the lack of invariance principles abilities to express strategies for individual fitness heterogeneous behaviors competition up to proliferative and or destructive actions mutations learning ability evolution and many others Applied mathematicians in the field of living systems especially biological systems will appreciate the special class of integro differential equations offered here for modeling at the molecular cellular and tissue scales A unique perspective is also presented with a number of case studies in biological modeling *Mathematical Reviews* ,1991 **A Systems Biology Approach to Blood** Seth Joel Corey,Marek Kimmel,Joshua N. Leonard,2014-12-06 The blood system is multi scale from the organism to the organs to cells to intracellular signaling pathways to macromolecule interactions Blood consists of circulating cells cellular fragments platelets and microparticles and plasma macromolecules Blood cells and their fragments result from a highly ordered process hematopoiesis Definitive hematopoiesis occurs in the bone marrow where pluripotential stem cells give rise to multiple lineages of highly specialized cells Highly productive and continuously regenerative hematopoiesis requires a microenvironment of mesenchymal cells and blood vessels A Systems Biology Approach to Blood is divided into three main sections basic components physiological processes and clinical applications Using blood as a window one can study health and disease through this unique tool box with reactive biological fluids that mirrors the prevailing hemodynamics of the vessel walls and the various blood cell types Many blood diseases rare and common can and have been exploited using systems biology approaches with successful results and therefore ideal models for systems medicine More importantly hematopoiesis offers one of the best studied systems with insight into stem

cell biology cellular interaction development linage programing and reprograming that are every day influenced by the most mature and understood regulatory networks   **The Australian Mathematics Teacher** ,1987   <u>Biomimetic Materials And Design</u> Angela Dillow,Anthony Lowman,2002-08-28 Detailing techniques in wound healing and reconstruction this reference describes the mechanisms and architecture of biological systems to formulate and design natural and synthetic compounds degradable and non degradable scaffolds and targeted drug delivery devices It offers strategies to control adhesive interactions elicit specific cellular responses and improve the biocompatibility performance and durability of prosthetic materials Covering advances in the field the book discusses the effect of topographical features on cell behaviors such as orientation adhesion migration proliferation and differentation   **Precision agriculture '23** John V. Stafford,2023-08-14 Precision agriculture is a reality in agriculture and is playing a key role as the industry comes to terms with the environment market forces quality requirements traceability vehicle guidance and crop management Sensors now in use in agriculture are generating Big Data leading to the use of machine learning and AI an increasing challenge for agriculture Research continues to be necessary and needs to be reported and disseminated to a wide audience These edited proceedings contain peer reviewed papers presented at the 14th European Conference on Precision Agriculture held in Bologna Italy The papers reflect the wide range of disciplines that impinge on precision agriculture technology crop science soil science agronomy information technology decision support remote sensing data analysis and others The broad range of research topics reported will be a valuable resource for researchers advisors teachers and professionals in agriculture long after the conference has finished   <u>Science Abstracts</u> ,1993   <u>Energy Research Abstracts</u> ,1983   **Comprehensive Dissertation Index** ,1984   *International Aerospace Abstracts* ,1992   **Government Reports Announcements** ,1975-05-30   *Byte* ,1987   **AMSTAT News** American Statistical Association,2000   **Government Reports Announcements & Index** ,1994-05   **Metals Abstracts Index** ,1995   **Quality Concerns in Education** Manzoor Ahmad Bhat,2006 Study on the quality of education in private and government schools of Anantnag District   **Aerospace Medicine and Biology** ,1979 A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in Scientific and technical aerospace reports STAR and International aerospace abstracts IAA   <u>Science</u> John Michels (Journalist),2004 A weekly record of scientific progress   *Dissertation Abstracts International* ,1998

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