

MATHEMATICS

- The line passing through the points A(1, -2, -3) and B(4, -5, -6) intersects the plane $z = 1$ at the point
 A) $\left(\frac{7}{3}, -\frac{10}{3}, 1\right)$ B) $\left(-\frac{7}{3}, -\frac{10}{3}, 1\right)$ C) (-3, 2, 1) D) (-3, 6, 1)
- A box contains 8 items of which 2 are defective. A person draws 3 items from the box. Determine the expected number of defective items.
 A) 0.75 B) 0.3 C) 0.2 D) 0.1
- If $a = \cos \alpha + i \sin \alpha$, $b = \cos \beta + i \sin \beta$, $c = \cos \gamma + i \sin \gamma$ and $a + b + c = 0$, the value of $a^{-1} + b^{-1} + c^{-1}$ is
 A) 1 B) 0 C) -1 D) 2
- The value of λ for which the system of equations $x+y-2z=0$, $2x-3y+z=0$, $x-5y+4z=\lambda$ is consistent is
 A) 1 B) -1 C) 0 D) 2
- Suppose \vec{a} and \vec{b} are vectors such that $\vec{a} \times \vec{b} = 2\hat{i} + \hat{j} - \hat{k}$ and $\vec{a} + \vec{b} = \hat{i} - \hat{j} + \hat{k}$. The least value of $|\vec{a}|$ is
 A) $\frac{1}{\sqrt{2}}$ B) 2 C) $\sqrt{2}$ D) $\sqrt{2} - 1$
- A general solution to $y'' - \sqrt{5}y = 0$ is
 A) $y = c_1 e^{\sqrt{5}t} + c_2 t$ B) $y = c_1 \cos \sqrt{5}t + c_2 \sin \sqrt{5}t$
 C) $y = c_1 e^{\sqrt{5}t} + c_2 t e^{\sqrt{5}t}$ D) $y = c_1 e^{\sqrt[4]{5}t} + c_2 e^{-\sqrt[4]{5}t}$
- In a binary communication channel, the probability that a transmitted zero is received as zero is 0.95 and the probability that a transmitted one is received as one is 0.90. If the probability that a zero is transmitted is 0.4, then the probability that a one was transmitted, given that a one was received is
 A) $\frac{17}{28}$ B) $\frac{27}{37}$ C) $\frac{29}{37}$ D) $\frac{27}{28}$
- If $(\vec{a}, \vec{b}, \vec{c})$ are three vectors such that if $\vec{a} \times \vec{b} = \vec{c}$ and $\vec{b} \times \vec{c} = \vec{a}$, then
 A) If \vec{a}, \vec{b} and \vec{c} are pair-wise perpendicular
 B) $|\vec{a}| = |\vec{b}| = |\vec{c}| = 1$
 C) $|\vec{a}| = |\vec{b}| = |\vec{c}| \neq 1$
 D) $|\vec{a}| \neq |\vec{b}| \neq |\vec{c}|$
- If $[\times]$ denotes the greatest integer $\leq \times$, then the value of the integral $\int_4^{10} \frac{[x^2]dx}{[x^2 - 28x + 196] + [x]^2}$ is
 A) 0 B) 1 C) 3 D) 4
- The proposition $p \wedge (P \vee q)$ is
 A) a tautology
 B) a contradiction
 C) logically equivalent to $p \wedge q$
 D) logically equivalent to $p \vee q$