

QUESTION 6

If determinants are used to solve the system of equations

$$\begin{cases} 2x + y = 3 \\ x + 4y = 7 \end{cases}, \text{ then } y \text{ is equal to}$$

- A. $\begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix}$ C. $\begin{vmatrix} 2 & 3 \\ 1 & 7 \end{vmatrix}$ E. $\begin{vmatrix} 3 & 7 \\ 2 & 1 \end{vmatrix}$
- $\begin{vmatrix} 2 & 3 \\ 1 & 7 \end{vmatrix}$ $\begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix}$ $\begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix}$
- B. $\begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix}$ D. $\begin{vmatrix} 3 & 1 \\ 7 & 4 \end{vmatrix}$
- $\begin{vmatrix} 3 & 1 \\ 7 & 4 \end{vmatrix}$ $\begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix}$

QUESTION 7-9 / 3

Consider the following abstract mathematical system:

Undefined terms: elements $a, b, c \dots$ of class C ;
 operations h and $*$; relation $=$, having the
 conventional meaning of "equals".

[Note: the character h denotes the character lambda]
 [Note: originally $\langle \rangle$ was printed as $=$ overprinted with $a /$]

- Postulates: If $a, b,$ and c are any elements of C , then
- (1) $a h b$ and $a * b$ are elements of C .
 - (2) $a h b = b h a$.
 - (3) $a * (b * c) = (a * b) * c$.
 - (4) $a * b \langle \rangle b * a$, provided $a \langle \rangle b$.
 - (5) $a h (b * c) = (a h b) * (a h c)$.

DIRECTIONS: Answer each item, using the code

- A - if the proposition follows logically from the postulates.
 B - if the proposition is inconsistent with the postulates (i.e., contradicts the postulates).
 C - neither A nor B (i.e., the proposition neither follows from the postulates nor is contradicted by them).

7. $(a * b) h c = (c h a) * (c h b)$

8. $(a * b) h c = (a h c) * (b h c)$

9. $a h (b * c) = (a h c) * (a h b)$

QUESTION 14

Consider the matrices

$$A = \begin{pmatrix} 1 & x \\ 0 & 1 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} 1 & 0 \\ y & 1 \end{pmatrix}$$

where x and y are real numbers and $xy + yx \neq 0$,
 For which values of x and of y is the product of the matrices commutative ?

[Note: originally \neq was printed as a = overprinted with a /]

- I. $x = 0$
 - II. $y = 0$
 - III. $x = y$
- A. Only I
 - B. Only II
 - C. Only III
 - D. Both I and II
 - E. I, II, and III

QUESTION 15

Calculate $\arcsin \frac{1}{2} + \arcsin \frac{1}{\sqrt{2}}$ [Arc sin means "angle

between $-\frac{\alpha}{2}$ and $\frac{\alpha}{2}$ whose sin is"]

- A. $\frac{5\alpha}{12}$
- B. $\frac{7\alpha}{18}$
- C. $\frac{\alpha}{3}$
- D. $\arcsin \left(\frac{1 + \sqrt{2}}{2} \right)$
- E. $\arcsin \frac{\sqrt{3}}{2}$

QUESTION 16

For what values of x is the function

$$\frac{(1 - x)(1 + 3x)}{(2x - 1)(x - 2)}$$

positive ?
