QUESTIONNAIRE Mathematics Test 8. Population 3a QUESTION 1 3 If $\log 8 = -$, what is the value of a ? а 2 A. 2/3 B. 2 C. 4 D. 5 E. 6 QUESTION 2 If x and y are real numbers, for which values of x can you define y by х y = ----? û (9 - xý) A. All x except x = 3D. -3 < x < 3B. All x except x = 3 and x = -3C. x < -3 and x > 3E. x < 3 OUESTION 3 A set of 24 cards is numbered with the positive integers from 1 to 24. If the cards are shuffled and if only one is selected at random, what is the probability that the number on the card is divisible by 4 or 6? A. 1/6 B. 5/24 C. 1/4 D. 1/3 E. 5/12 QUESTION 4 An angle é is known to be between 180ø and 270ø and 16 cosý é = --. The value of sin 2é is then 25
 24
 15
 7
 7
 24

 A. - - B. - - C. - - D. - E. -

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25 25 25 25 25 QUESTION 5 For some functions the relationship holds that f(x + y) = f(x) + f(y)for all numbers x and y. For example, when f(x) = 2x, then f(x + y) = 2(x + y) = 2x + 2y = f(x) + f(y), i.e., f(x + y) = f(x) + f(y). We call such functions as these additive. Which of the following functions is additive by this definition ? x D. f(x) = 2A. $f(x) = x\dot{y}$ B. $f(x) = \sin x$ C. $f(x) = \log x$ E. None of them is additive 10

OUESTION 6 If determinants are used to solve the system of equations | 2x + y = 3x + 4y = 7, then y is equal to A. | 2 1 | C. | 2 3 | E. | 3 7 | 2 1 1 4 $\begin{vmatrix} 2 & 1 \\ ---- \\ 2 & 1 \\ 1 & 4 \end{vmatrix}$ İ----| |----| 2 1 2 3 1 4 D. | 3 1 | B. | 2 1 | 1 4 |----| 2 1 3 1 74 QUESTION 7-9 / 3 Consider the following abstract mathematical system: Undefined terms: elements a, b, c of class C; operations h and * ; relation = , having the conventional meaning of "equals". [Note: the character h denotes the character lambda] [Note: originally <> was printed as a = overprinted with a / 1 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 <> b * a, provided a <> 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. ah(b*c) = (ahc)*(ahb)

OUESTION 10 The graph of y = f(x) is a parabola with axis parallel to the Y-axis. If the maximum value of y is 2, and if the parabola crosses the X-axis 1 3 at x = - and at x = -, then its equation is 2 2 3 A. $y = -2x\hat{y} + 2x + -$ D. $y = 4x\dot{y} - 4x - 3$ B. $y = -4x\hat{y} - 4x + 3$ C. $y = -4x\dot{y} + 4x + 3$ E. y = 4xy + 4x - 3QUESTION 11 1 For what values of the real number x is y = х a decreasing function? [Note: originally <> was printed as a = overprinted with a /] A. No x B. x < 0 C. x <> 0 D. x > 0 E. All x QUESTION 12 2+x 3+x Solve: 2 . 7 + 3 . 7 = 161 QUESTION 13 Given two arbitrary sets X and Y, which of the following sets is equivalent to the set (XuY) n (XnY) ? [Note: the character n denotes the character for an intersection of sets] [: the character u denotes the character for a union of sets] A. X C. XuY D. XnY в. Ү E. (X u Y) u (X n Y)

QUESTION 14 Consider the matrices $A = \begin{pmatrix} 1 & x \\ x & y \end{pmatrix} \text{ and } B = \begin{pmatrix} 1 & y \\ y & y \end{pmatrix}$ where x and y are real numbers and $x\dot{y} + y\dot{y} <> 0$, For which values of x atld of y is the product of the matrices commutative ?] [Note: originally <> was printed as a = overprinted with a / I. x = 0 II. y = 0 III. x = y A. Only IB. Only IIC. Only III D. Both I and II E. I,II, and III OUESTION 15 ã ã between - - and - whose sin is"] 2 2 1 + û2 5ã A. --D. arc sin (-----) 2 12 7ã в. --18 ã û3 C. -E. arc sin --3 2 QUESTION 16 For what values of x is the function (1 - x) (1 + 3x)_____ (2x - 1) (x - 2)positive ?