MS121, Test 3a, 19th. Oct. 2019

Name: _____	Student No.: _____

?. If P is the set of divisors of 90 with partial order 'is a divisor of', which one of the following is **not** an immediate successor of 3?

(A) 6, (B) 9, (C) 30, (D) 15.

Answer: C : In the partial order we can fit both 6 and 15 between 3 and 30.

?. Suppose $X = \{x, y, z\}$, $Y = \{a, b\}$ and $Z = \{p, q, r\}$ while $R = \{(x, a), (y, a), (y, b), (z, b)\}$ is a relation between X and Y and $S = \{(a, p), (a, q), (b, q), (b, r)\}$ is a relation between Y and Z. Which one of the following pairs is **not** in $S \circ R$?

(A) (x, p), (B) (y, p), (C) (z, p), (D) (z, q).

Answer: C : We have xRa and aSp so answer is not A. We have yRa and aSp so answer is not B. We have zRb and bSq so answer is not D.

?. Suppose $S = T = \{0, 1, 2, 3, 4, 5, 6\}$ and $f : S \to T$ is given by $f(k) = r$ where r is the remainder when $3k$ is divided by 7. Then f is

(A) Injective but not surjective, (B) Surjective but not injective ,
(C) Bijective, (D) Neither injective nor surjective.

Answer: C: $f(0) = 3(0) \bmod 7 = 0 \bmod 7 = 0$, $f(1) = 3(1) \bmod 7 = 3 \bmod 7 = 3$, $f(2) = 3(2) \bmod 7 = 6 \bmod 7 = 6$, $f(3) = 3(3) \bmod 7 = 9 \bmod 7 = 2$, $(9 = (1)7 + 2)$, $f(4) = 3(4) \bmod 7 = 12 \bmod 7 = 5$, $(12 = (1)7 + 5)$, $f(5) = 3(5) \bmod 7 = 15 \bmod 7 = 1$, $(15 = (2)7 + 1)$, $f(6) = 3(6) \bmod 7 = 18 \bmod 7 = 4$, $(18 = (2)7 + 4)$.

?. The inverse of $f(x) = (2x + 3)/(-x - 2)$ is

(A) $g(y) = (3y + 2)/(-y - 2)$, (B) $g(y) = (2y + 3)/(-2y - 1)$, (C) $g(y) = (3y + 2)/(-2y - 1)$, (D) $g(y) = (2y + 3)/(-y - 2)$.

Answer: D: If $y = (2x + 3)/(-x - 2)$ then $-xy - 2y = 2x + 3$ so that $-xy - 2x = 2y + 3$ and $x = (2y + 3)/(-y - 2)$.