MS121, Test 3b, 20th. Nov. 2019

Name: _____	Student No.: _____

?. If P is the set of divisors of 150 with partial order 'is a divisor of', which one of the following is **not** an immediate successor of 5?

(A) 10, (B) 15, (C) 30, (D) 25.

Answer: C : In the partial order we can fit both 10 and 15 between 5 and 30.

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

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

Answer: C : We have xRa and aSq so answer is not A. We have yRb and bSp so answer is not B. We have zRa and aSq 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 k^2 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: D : The squares of the numbers in $\{0, 1, 2, 3, 4, 5, 6\}$ are $\{0, 1, 4, 9, 16, 25, 36\}$. The remainders mod 7 of these numbers are $\{0, 1, 4, 2, 2, 4, 1\}$.

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

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

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