

Maths 2 Continuous Assessment 1 Exam number 1

Print your Name:

Answer all questions in the table provided.

Questions	1	2	3	4	5	6	7	8	9	10
Answers										

Question 1 Let $Y = \{m, y, j, o, r, f\}$ and let $M = \{17, 10, 5\}$. Let U be a relation from Y to M defined by:

$$U = \{(j, 5), (o, 5), (o, 17), (m, 17)\}$$

What is the codomain of the relation U .

- (a) $\{o\}$ (b) $\{5, m, j, o, 17\}$ (c) $\{5, m, y, 10, j, o, 17\}$ (d) $\{r\}$
 (e) $\{17, 10, 5\}$ (f) $\{m, y, j, o, r, f\}$ (g) $\{17, 5\}$ (h) $\{j, o, m\}$

Question 2 Let $X = \{5, 10, 11, 13, 15\}$. Let N be a relation from X to X defined by:

$$N = \{(15, 5), (15, 11), (10, 5), (5, 5), (11, 10), (13, 10), (13, 13), (15, 10), (10, 10), (5, 10), (11, 5), (13, 5)\} \\ \cup \{(11, 11), (15, 15)\}$$

Which one of these statements is true for the relation N .

- (a) It is reflexive and transitive, but not symmetric (b) It is neither reflexive, nor symmetric, but is transitive
 (c) It is reflexive, but neither symmetric, nor transitive (d) It is neither reflexive, nor transitive, but is symmetric
 (e) It is reflexive and symmetric and transitive (f) It is neither reflexive, nor symmetric, nor transitive
 (g) It is not reflexive, but is both symmetric and transitive (h) It is reflexive and symmetric, but not transitive

Question 3 Let $R = \{4, 5, 8, 11, 20\}$ and let $J = \{l, x, c, q, z, d\}$. Let O be a relation from R to J defined by:

$$O = \{(20, c), (4, d), (20, z), (11, x)\}$$

What is the domain of the relation O .

- (a) $\{4, 5\}$ (b) $\{l, x, c, q, z, d\}$ (c) $\{x, z, d, c\}$ (d) $\{11, 20, 4\}$
 (e) $\{20\}$ (f) $\{4, x, 11, c, 20, z, d\}$ (g) $\{4, 5, 8, 11, 20\}$ (h) $\{4, 5, l, 8, x, 11, c\}$

Question 4 Let $L = \{m, e, z, r, u\}$ and let $J = \{5, 6, 13, 15, 20\}$. Let B be a relation from L to J defined by:

$$B = \{(r, 5), (e, 5), (m, 20), (z, 13), (u, 6)\}$$

Which one of these statements is true for the function B .

- (a) It is injective and bijective, but not surjective
- (b) It is not injective, but is both surjective and bijective
- (c) It is neither injective, nor surjective, nor bijective
- (d) It is injective, but neither surjective, nor bijective
- (e) It is injective and surjective and bijective
- (f) It is neither injective, nor surjective, but is bijective
- (g) It is injective and surjective, but not bijective
- (h) It is neither injective, nor bijective, but is surjective

Question 5 Let $J = \{i, b, k, a, g\}$. Let X be a relation from J to J defined by:

$$X = \{(b, b), (a, i), (i, i), (a, g), (g, k), (a, k), (b, k), (i, b)\}$$

Which one of these statements is true for the relation X .

- (a) It is not reflexive, but is both symmetric and transitive
- (b) It is neither reflexive, nor transitive, but is symmetric
- (c) It is reflexive, but neither symmetric, nor transitive
- (d) It is reflexive and symmetric and transitive
- (e) It is reflexive and transitive, but not symmetric
- (f) It is neither reflexive, nor symmetric, but is transitive
- (g) It is reflexive and symmetric, but not transitive
- (h) It is neither reflexive, nor symmetric, nor transitive

Question 6 Let $S = \{4, 7, 12, 13, 18\}$ and let $I = \{n, w, s, r, g\}$. Let K be a relation from S to I defined by:

$$K = \{(7, g), (12, s), (4, r), (13, n), (18, r)\}$$

Which one of these statements is true for the function K .

- (a) It is injective and surjective and bijective
- (b) It is injective and bijective, but not surjective
- (c) It is neither injective, nor bijective, but is surjective
- (d) It is neither injective, nor surjective, nor bijective
- (e) It is injective and surjective, but not bijective
- (f) It is injective, but neither surjective, nor bijective
- (g) It is neither injective, nor surjective, but is bijective
- (h) It is not injective, but is both surjective and bijective

Question 7 Let $K = \{w, f, r\}$ and let $L = \{2, 3, 6, 8, 15, 20\}$. Let H be a relation from K to L defined by:

$$H = \{(r, 8), (w, 2), (r, 20), (f, 20), (w, 20), (r, 6), (f, 3), (r, 15), (f, 6), (f, 2), (r, 2)\}$$

List the elements of $\{r\} \triangleleft H$.

- (a) $\{(w, 2), (f, 20), (w, 20), (f, 3), (f, 6), (f, 2)\}$
- (b) $\{(w, 8), (w, 2), (w, 6), (r, 2)\}$
- (c) $\{(w, 3), (w, 8), (w, 15), (r, 6), (w, 6)\}$
- (d) $\{(r, 8), (r, 20), (f, 20), (w, 20), (r, 6), (f, 3), (f, 6)\}$
- (e) $\{(r, 15), (r, 2), (f, 2), (w, 2)\}$
- (f) $\{(r, 8), (r, 20), (r, 6), (r, 15), (r, 2)\}$
- (g) $\{(f, 6)\}$
- (h) $\{(w, 15), (f, 2), (f, 3)\}$

Question 8 Let $Y = \{1, 5, 6, 8, 9\}$ and let $A = \{x, h, e\}$. Let X be a relation from Y to A defined by:

$$X = \{(1, e), (8, x), (9, h), (5, x), (6, x), (9, e), (1, x), (6, h)\}$$

List the elements of $X \triangleright \{h, x\}$.

- (a) $\{(1, e), (9, h), (5, x), (8, h), (6, x), (9, e)\}$ (b) $\{(1, e), (9, h), (6, x), (9, e), (1, x), (6, h)\}$
- (c) $\{(1, e), (9, e)\}$ (d) $\{(5, e), (5, x), (6, e), (6, x)\}$
- (e) $\{(6, x), (1, x)\}$ (f) $\{(8, x), (9, h), (5, x), (6, x), (1, x), (6, h)\}$
- (g) $\{(5, x), (8, x)\}$ (h) $\{(6, h)\}$

Question 9 Let $H = \{2, 15\}$ and let $Z = \{u, e, m\}$. Let A be a relation from H to Z defined by:

$$A = \{(15, e), (2, u), (15, m), (2, e), (15, u)\}$$

What is the inverse of the relation A .

- (a) The relation from Z to H defined by $\{(15, e), (15, m), (2, m), (2, u), (2, e), (15, u)\}$
- (b) The relation from Z to H defined by $\{(15, e), (2, u), (15, m), (2, e), (15, u)\}$
- (c) The relation from Z to H defined by $\{(e, 2), (u, 15), (e, 15), (u, 2), (m, 2), (m, 15)\}$
- (d) The relation from H to Z defined by $\{(u, 15), (e, 2), (e, 15), (u, 2), (m, 15)\}$
- (e) The relation from H to Z defined by $\{(15, e), (2, u), (15, m), (2, e), (15, u)\}$
- (f) The relation from Z to H defined by $\{(u, 15), (e, 2), (e, 15), (u, 2), (m, 15)\}$
- (g) The relation from H to Z defined by $\{(15, e), (15, m), (2, m), (2, u), (2, e), (15, u)\}$
- (h) The relation from H to Z defined by $\{(e, 2), (u, 15), (e, 15), (u, 2), (m, 2), (m, 15)\}$

Question 10 Let N be a relation from $J = \{11, 19, 4\}$ to $O = \{f, s, m\}$ defined by

$$N = \{(11, f), (4, s), (19, s), (11, s)\}.$$

Let Q be a relation from O to $F = \{8, 19, 2, 3\}$ defined by

$$Q = \{(m, 8), (f, 8), (s, 19), (s, 2), (s, 8), (m, 19), (m, 3), (f, 19)\}.$$

List the tuples of the composition $Q \circ N$

- (a) $\{(19, 8), (4, 19), (11, 19), (4, 2), (19, 19), (11, 2), (19, 3), (4, 8), (19, 2), (11, 8)\}$
- (b) $\{(19, 8), (4, 19), (4, 3), (11, 19), (4, 2), (19, 19), (11, 2), (4, 8), (19, 2), (11, 8)\}$
- (c) $\{(19, 8), (4, 19), (11, 19), (4, 2), (11, 2), (4, 8), (19, 2), (11, 8)\}$
- (d) $\{(19, 8), (4, 19), (11, 19), (11, 3), (4, 2), (19, 19), (11, 2), (4, 8), (19, 2), (11, 8)\}$
- (e) $\{(19, 8), (4, 19), (11, 19), (19, 19), (11, 2), (4, 8), (19, 2), (11, 8)\}$
- (f) $\{(19, 8), (4, 19), (4, 2), (19, 19), (11, 2), (4, 8), (19, 2), (11, 8)\}$
- (g) $\{(19, 8), (4, 19), (11, 19), (4, 2), (19, 19), (4, 8), (19, 2), (11, 8)\}$
- (h) $\{(19, 8), (4, 19), (11, 19), (4, 2), (19, 19), (11, 2), (4, 8), (19, 2), (11, 8)\}$