

Discrete Structures

Homework



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Asocie cada conjunto de la columna I con la descripción apropiada de la columna II.

I

- F ① $\{1, 3, 5, 7, 9\}$
- G ② $\{x \mid x \text{ es un número entero par mayor que 4 y menor que 6}\}$
- F ③ $\{\dots, -4, -3, -2, -1\}$
- D ④ $\{\dots, -5, -3, -1, 1, 3, 5, \dots\}$
- B ⑤ $\{2, 4, 8, 16, 32\}$
- A ⑥ $\{\dots, -4, -2, 0, 2, 4, \dots\}$
- C ⑦ $\{2, 4, 6, 8, 10\}$
- H ⑧ $\{2, 4, 6, 8\}$

II

- 6 ① El conjunto de todos los números enteros pares
- 5 ② El conjunto de las cinco potencias menores positivas enteras de 2.
- 7 ③ El conjunto de números enteros positivos pares menores que 10.
- 4 ④ El conjunto de todos los números enteros noes.
- 3 ⑤ El conjunto de todos los números enteros negativos.
- 1 ⑥ El conjunto de números enteros positivos noes menores que 10.
- 2 ⑦ \emptyset
- 8 ⑧ El conjunto de los cinco múltiplos mínimos de 2 que sean números enteros positivos

(9) El conjunto de todos los números cardinales menores o iguales que 6.

$\{ \text{Zero, uno, dos, tres, cuatro, cinco \& seis} \}$

(14) $\{ 3, 6, 9, 12, \dots, 30 \} \rightarrow \{ 3, 6, 9, 12, 15, 18, 21, 24, 27, 30 \}$

Números positivos, múltiplos de 3 hasta el 30

(16) $\{ -4, -3, -2, \dots, 4 \} \rightarrow \{ -4, -3, -2, -1, 0, 1, 2, 3, 4 \}$

Números enteros del -4 al 4

(19) $\{ x \mid x \text{ es un número entero no negativo par menor que } 11 \}$

$\{ 0, 2, 4, 6, 8, 10 \}$

no no no no no no no no no no

(61) $5 \in \{ 2, 4, 5, 7 \}$ (65) $\{ 3 \} \not\subseteq \{ 2, 3, 4, 6 \}$

(62) $-4 \notin \{ 4, 7, 8, 12 \}$ (66) $\{ 6 \} \not\subseteq \{ 5+1, 6+1 \}$

(63) $-12 \notin \{ 3, 8, 12, 18 \}$ (67) $8 \in \{ 11-2, 10-2, 9-2, 8-2 \}$

(64) $0 \in \{ -2, 0, 5, 9 \}$

no no no no no no no no no no

(75) $\{ k, c, r, a \} = \{ k, c, a, r \}$ True

(76) $\{ e, h, a, n \} = \{ a, h, e, n \}$ True

(77) $\{ 5, 8, 9 \} = \{ 5, 8, 9, 0 \}$ False

(78) $\{ 3, 7, 12, 14 \} = \{ 3, 7, 12, 14, 0 \}$ False

(79) $\{ 4 \} \in \{ \{ 3 \}, \{ 4 \}, \{ 5 \} \}$ True

(80) $4 \in \{ \{ 3 \}, \{ 4 \}, \{ 5 \} \}$ False

$$(5) \{ -2, 0, 2 \} \not\subseteq \{ -2, -1, 1, 2 \} \quad (9) \emptyset \not\subseteq \{ a, b, c, d, e \}$$

$$(6) \{ M, W, F \} \not\subseteq \{ S, M, T, W, Th \} \quad (10) \emptyset \subseteq \emptyset$$

$$(7) \{ 2, 5 \} \subseteq \{ 0, 1, 5, 3, 7, 2 \} \quad (11) \{ -5, 2, 9 \} \not\subseteq \{ x | x \text{ es un número entero par} \}$$

$$(8) \{ a, n, d \} \subseteq \{ r, a, n, d, e \} \quad (12) \{ 1, 2, \frac{9}{3} \} \subseteq \text{el conjunto de números racionales}$$

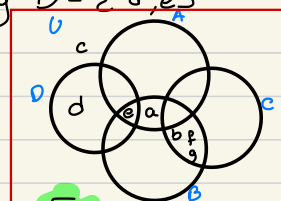
$$(13) \{ P, Q, R \} \subseteq \{ P, Q, R, S \} \quad (17) \emptyset \subseteq \{ 0 \}$$

$$(14) \{ rojo, azul, amarillo \} \not\subseteq \{ amarillo, azul, rojo \} \quad (18) \emptyset \subseteq \emptyset$$

$$(15) \{ 9, 1, 7, 3, 5 \} \not\subseteq \{ 1, 3, 5, 7, 9 \} \quad (19) \{ 0, 1, 2, 3 \} \subseteq \{ 1, 2, 3, 4 \}$$

$$(16) \{ S, M, T, W, Th \} \not\subseteq \{ W, F, E, K \} \quad (20) \{ \frac{5}{6}, \frac{7}{8} \} \not\subseteq \{ \frac{6}{6}, \frac{8}{9} \}$$

Sea $U = \{ a, b, c, d, e, f, g \}$, $A = \{ a, e \}$,
 $B = \{ a, b, e, f, g \}$, $C = \{ b, f, g \}$, y $D = \{ d, e \}$



$$(21) A \subset U \text{ True} \quad (30) D \subset B \text{ True}$$

$$(22) C \not\subset U \text{ False} \quad (31) D \subseteq B \text{ True}$$

$$(23) D \subseteq B \text{ True} \quad (32) A \subseteq B \text{ True}$$

$$(24) D \not\subseteq A \text{ False} \quad (33) \text{Hay exactamente 6 subconjuntos de } C \text{ False}$$

$$(25) A \subset B \text{ True} \quad (34) \text{Hay exactamente 31 subconjuntos de } B \text{ False}$$

$$(26) B \subseteq C \text{ True} \quad (35) \text{Hay exactamente 3 subconjuntos propios de } A \text{ False}$$

$$(27) \emptyset \not\subset A \text{ False} \quad (36) \text{Hay exactamente 4 subconjuntos de } D \text{ False}$$

$$(28) \emptyset \subseteq D \text{ True} \quad (37) \text{Hay exactamente 1 subconjunto de } \emptyset \text{ True}$$

$$(29) \emptyset \subseteq \emptyset \text{ True} \quad (38)$$

(31) Suppose $A = \{1, 2, 3\}$ and $B = \{2, 3, 3\}$. Find each of the following:

Q. $\mathcal{P}(A \cap B) \rightarrow \{2\} \rightarrow \{\emptyset, \{2\}, \{2, 3\}\}$

② $\mathcal{P}(A \cup B) \rightarrow \{1, 2, 3\} \rightarrow \{\emptyset, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}\}$

⑥ $\mathcal{P}(A) \rightarrow \{1, 2\} \rightarrow \{\emptyset, \{1\}, \{2\}, \{1, 2\}\}$

d) $\mathcal{P}(A \times B) \rightarrow \{ \{1, 2\}, \{1, 3\}, \{2, 2\}, \{2, 3\} \} \rightarrow \{ \emptyset, \{1, 2\}, \{1, 3\}, \{2, 2\}, \{2, 3\}, \{1, 2, 1, 3\}, \{1, 2, 2, 2\}, \{1, 2, 2, 3\}, \{1, 3, 2, 2\}, \{1, 3, 2, 3\}, \{1, 2, 1, 3, 2, 2\}, \{1, 2, 1, 3, 2, 3\}, \{1, 2, 2, 2, 2, 3\}, \{1, 3, 2, 2, 2, 3\}, \{2, 3, 1, 3, 1, 2\}, \{1, 2, 1, 3, 2, 2, 2, 3\} \}$

32) a) Suppose $A = \{1, 3\}$ and $B = \{u, v\}$. Find $\mathcal{P}(A \times B)$.

$$\{ \{1, u\}, \{1, v\}, \{u, v\} \} \rightarrow \{ \emptyset, \{1, u\}, \{1, v\}, \{u, v\}, \{1, u\}, \{1, v\}, \{1, v\}, \{u, v\}, \{1, u\}, \{1, v\}, \{u, v\}, \{1, u\}, \{1, v\}, \{u, v\} \}$$

⑥ Suppose $X = \{a, b\}$ and $Y = \{x, y\}$. Find $\mathcal{P}(X \times Y)$.

$$\{ (a, x), (a, y), (b, x), (b, y) \} \rightarrow \{ \emptyset, \{ (a, x) \}, \{ (a, y) \}, \{ (b, x) \}, \{ (b, y) \}, \{ (a, x), (a, y) \}, \{ (a, x), (b, x) \}, \{ (a, x), (b, y) \}, \{ (a, y), (b, x) \}, \{ (a, y), (b, y) \}, \{ (b, x), (b, y) \}, \{ (a, x), (a, y), (b, x) \}, \{ (a, x), (a, y), (b, y) \}, \{ (a, x), (b, x), (b, y) \}, \{ (a, y), (b, x), (b, y) \}, \{ (a, x), (a, y), (b, x), (b, y) \} \}$$

33) @ Find $\mathcal{P}(\emptyset) \rightarrow \{\emptyset, \{\emptyset\}\}$

⑥ Find $\mathcal{P}(\mathcal{P}(\emptyset)) \rightarrow \Delta \{ \emptyset, \{ \emptyset \}, \{ \{ \emptyset \} \}, \{ \emptyset, \{ \emptyset \} \} \}$

c) Find $\mathcal{P}(\mathcal{P}(\mathcal{P}(\emptyset)))$. $\rightarrow \emptyset, \{\emptyset\}, \{\emptyset, \{\emptyset\}\}, \{\emptyset, \{\emptyset, \{\emptyset\}\}\}$
 $\{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset\}\}\}\}, \{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset\}\}\}\}\}, \{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset\}\}\}\}\}\}$

(34) Let $A_1 = \{1, 2, 3\}$, $A_2 = \{u, v\}$, and $A_3 = \{m, n\}$. Find each of the following sets:

(a) $A_1 \times (A_2 \times A_3)$
 $\{(u, m), (u, n), (v, m), (v, n)\}$
 $\downarrow \quad \downarrow \quad \downarrow$
 $\{(1, (u, m)), (1, (u, n)), (1, (v, m)), (1, (v, n)), (2, (u, m)), (2, (u, n)), (2, (v, m)), (2, (v, n)), (3, (u, m)), (3, (u, n)), (3, (v, m)), (3, (v, n))\}$

(b) $(A_1 \times A_2) \times A_3$
 $\{(1, u), (1, v), (2, u), (2, v), (3, u), (3, v)\}$
 $\downarrow \quad \downarrow \quad \downarrow$
 $\{(m, (1, u)), (m, (1, v)), (m, (2, u)), (m, (2, v)), (m, (3, u)), (m, (3, v)), (n, (1, u)), (n, (1, v)), (n, (2, u)), (n, (2, v)), (n, (3, u)), (n, (3, v))\}$

(c) $A_1 \times A_2 \times A_3$
 $\{(1, u, m), (1, v, m), (1, u, n), (1, v, n), (2, u, m), (2, v, m), (2, u, n), (2, v, n), (3, u, m), (3, v, m), (3, u, n), (3, v, n)\}$

(35) Let $A = \{a, b\}$, $B = \{1, 2, 3\}$, and $C = \{z, 3\}$. Find each of the following sets.

(a) $A \times (B \cup C) \rightarrow B \cup C = \{1, 2, 3, z\} \rightarrow A = \{a, b\} \rightarrow$
 $A \times (B \cup C) = \{(1, a), (1, b), (2, a), (2, b), (3, a), (3, b), (z, a), (z, b)\}$

(b) $(A \times B) \cup (A \times C) \rightarrow (A \times B) = \{(1, a), (1, b), (2, a), (2, b), (3, a), (3, b)\} \rightarrow$
 $(A \times C) = \{(2, a), (2, b), (3, a), (3, b), (z, a), (z, b)\} \rightarrow (A \times B) \cup (A \times C) =$
 $\{(1, a), (1, b), (2, a), (2, b), (3, a), (3, b), (z, a), (z, b)\}$

(c) $A \times (B \cap C) \rightarrow (B \cap C) = \{z\} \rightarrow A \times (B \cap C) = \{(z, a), (z, b)\}$