WI23_CSBR-NY_1_NC_INT2 HW3 (7 to 11)

Aaron Bengochea

TOTAL POINTS

38.5 / 52

QUESTION 1

1 Q7 19 / 25

- **0 pts** Correct
- **25 pts** No submission

3.1.1

- **1 pts** 3.1.1 a is True.
- **1 pts** 3.1.1 b is False.
- **1 pts** 3.1.1 c is True.
- **1 pts** 3.1.1 d is False.
- **1 pts** 3.1.1 e is True.
- **1 pts** 3.1.1 f is False.

✓ **- 1 pts** *3.1.1 g is False.*

- **7 pts** Missing

3.1.2

✓ **- 1 pts** *3.1.2 a is False.*

- **1 pts** 3.1.2 b is True.
- **1 pts** 3.1.2 c is True.
- **1 pts** 3.1.2 d is True.
- **1 pts** 3.1.2 e is False.
- **5 pts** Missing

3.1.5

- **1 pts** 3.1.5b

$$\{ x \in Z^+: x \text{ is an integer multiple of } 3 \}\\ \text{Infinite cardinality}$$

- **1 pts** 3.1.5d $$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}\\ \text{Cardinality} = 101$$

- **0.5 pts** Missing/incorrect cardinality for 3.1.5 b
- **0.5 pts** Missing/incorrect cardinality for 3.1.5 d
- **2 pts** Missing
- **0.5 pts** 3.1.5 b & d

Inconsistent use of $$N$$ (in B you assumed $$N$$ excludes 0 but in D you included 0 in $$N$$)

- **0.5 pts** 3.1.5 b

Incorrect use of $$Z$$ (recall that $$Z$$ includes 0 and other negative integers, which can also be multiples of 3). Use $$Z^+$$ instead.

- **0.5 pts** ``3.1.5 d

Did not exclude negative numbers for the set (recall that $$Z$$ includes non-positive numbers).

Correct ans: $$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}\\ \text{Cardinality} = 101$$

- **0.5 pts** 3.1.5 b

Did not use set builder notation / incorrect set builder notation

Correct ans:

$$\{ x \in Z^+: x \text{ is an integer multiple of } 3 \}$$

- **0.5 pts** 3.1.5 d

Did not use set builder notation / incorrect set

builder notation

Correct ans:

$$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}$$

- 0.5 pts 3.1.5 d

Did not include 0 (recall that $$Z^+$$ does not include 0). Use $$Z$$ instead

- 0.5 pts 3.1.5 d

Did not exclude multiples of 10 that are larger than 1000. Correct ans:

$$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}$$

3.2.1

- 1 pts 3.2.1 a is True.

- 1 pts 3.2.1 b is True.

✓ **- 1 pts** *3.2.1 c is False.*

- 1 pts 3.2.1 d is False.

- 1 pts 3.2.1 e is True.

- 1 pts 3.2.1 f is True.

✓ **- 1 pts** *3.2.1 g is True.*

- 1 pts 3.2.1 h is False.

✓ **- 1 pts** *3.2.1 i is False.*

✓ **- 1 pts** *3.2.1 j is False.*

- 1 pts 3.2.1 k is False.

- 11 pts Missing

QUESTION 2

2 Q8 **0 / 2**

- 0 pts Correct:

$$\{\{2\},\{1,2\},\{2,3\},\{1,2,3\}\}$$

✓ **- 2 pts** *No submission / Incorrect*

- 1 pts Missed one element or parentheses issue

QUESTION 3

3 Q9 **5 / 9**

- 0 pts Correct

- 9 pts No submission

- 1 pts 3.3.1c $$\{-3, 1, 17\}$$

- 0.1 pts 3.3.1c Missing element

- 1 pts 3.3.1d $$\{-5, -3, 0, 1, 4, 17\}$$

- 0.1 pts 3.3.1d missing/incorrect element

- 0.1 pts 3.3.1d should be -3 not -2

- 1 pts 3.3.1e $$\{1\}$$

- 1 pts 3.3.3a $$\{1\}$$

- 0.1 pts 3.3.3a missing brackets

- 1 pts 3.3.3b $$\{1, 2, 3, 4, 5, 9, 16, 25\}$$

- 0.1 pts 3.3.3b Missing/Incorrect Element

✓ **- 1 pts** *3.3.3e $$\{ x \in \mathbb R : -1/100 \leq x \leq 1/100\}$$*

- 0.1 pts 3.3.3e Missing braces

- 0.1 pts 3.3.3e should be - 1/100 not -100

✓ **- 1 pts** *3.3.3f $$\{ x \in \mathbb R : -1 \leq x \leq 1\}$$*

- 0.5 pts 3.3.3e, f did not express set builder notation properly.

- 0.1 pts 3.3.3f Missing Braces

✓ **- 1 pts** *3.3.4b $$\{ \varnothing, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}, \{a,c\}, \{a,b,c\}\}$$*

- 0.1 pts 3.3.4b Should be {b, c} not {b,d}

✓ **- 1 pts** *3.3.4d $$\{ \varnothing, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}\}$$*

- 0.5 pts 3.3.4b,d Missing null set in one or more questions or has an error with one element.

- 0.1 pts Incorrect question but correct answer

- 0.1 pts Incorrect way to write null set

- 0.1 pts 3.3.1c Missing brackets

- 0.1 pts 3.3.1e missing brackets

QUESTION 4

4 Q10 6 / 10

- **0 pts** Correct
- **10 pts** No submission

A

- **1 pts** 3.5.1 B

One possible answer: $$(\textrm{foam, tall, non-fat})$$

- **1 pts** 3.5.1 C

$$\{(\textrm{foam, non-fat}), (\textrm{foam, whole}), \\(\textrm{no-foam, non-fat}), (\textrm{no-foam, whole})\}$$

B

- **1 pts** 3.5.3 B

True. If $$(x, y) \in \mathbb Z^2$$, then $$x$$ and $$y$$ are integers. Every integer is also a real number, so $$(x, y) \in \mathbb R^2$$.

- **1 pts** 3.5.3 C

True. The elements in $$\mathbb Z^2$$ are pairs. The elements in $$\mathbb Z^3$$ are triples. Therefore the two sets have no elements in common.

✓ **- 1 pts** *3.5.3 E*

True. If $$(a, c) \in A \times C$$, then $$a \in A$$ and $$c \in C$$. Since $$A \subseteq B$$, then $$a \in B$$. Therefore $$(a, c) \in B \times C$$.

C

✓ **- 1 pts** *3.5.6 D*

$$\{01, 011, 001, 0011\}$$

- **1 pts** 3.5.6 E

$$\{aaa, aaaa, aba, abaa\}$$

D

✓ **- 1 pts** *3.5.7 C*

$$\{aa, ab, ac, ad\}$$

- **1 pts** 3.5.7 F

$$\{\varnothing, \{ab\}, \{ac\}, \{ab,ac\}\}$$

✓ **- 1 pts** *3.5.7 G*

$$\{(\varnothing, \varnothing), (\varnothing, \{b\}), (\varnothing, \{c\}), (\varnothing, \{b,c\}), \\(\{a\}, \varnothing), (\{a\}, \{b\}), (\{a\}, \{c\}), (\{a\}, \{b,c\})\}$$

1 {bc} is not the same as {b,c}

QUESTION 5

5 Q11 3.5 / 6

- **0 pts** Correct
- **6 pts** No submission

✓ **- 1 pts** *3.6.2b*

i. $$(B \cap B) \cup A$$ Distributive law

ii. $$\varnothing \cup A$$ Complement law

iii. $$A \cup \varnothing$$ Commutative law

iii. $$A$$ Identity law

- **1 pts** 3.6.2c

i. De Morgan's Law

ii. Double Complement Law

- **1 pts** 3.6.3b

If $$A = \{a, b\}$$, and $$B = \{a\}$$, then $$A - (B \cap A) = \{b\}$$, which is not equal to $$A$$.

- **1 pts** 3.6.3d

If $$A = \{a\}$$, and $$B = \{b\}$$, then $$(B - A) \cup A = \{a,b\}$$, which is not equal to $$A$$.

✓ **- 1 pts** *3.6.4b*

i. Set Subtraction law

ii. Commutative Law

iii. Associative Law

iv. Complement Law

v. Commutative Law

vi. Domination Law

✓ **- 1 pts** *3.6.4c*

i. Set Subtraction law

ii. Distributive Law

iii. Complement Law

iv. Identity Law

- 6 pts Not submitted or incorrect

+ 0.5 *Point adjustment*

half point deducted from 3.6.4c

2 This is not one of the set identities from the table

3 please note that "empty set" and "{empty set}" are different.

4 Incorrect use of distributive law

5 This is Identity law

QUESTION 6

6 typed EC 5 / 0

✓ **+ 5 pts** *entirely typed*

+ 0 pts not entirely typed

QUESTION 7

7 Tagging / Starting questions on new pages / Formatting equations 0 / 0

✓ **- 0 pts** *Correct*

- 10 pts Untagged / Did not start questions on new pages / Too many unformatted equations

Question #7:

a.a) True

a.b) False

a.c) True

a.d) False

a.e) True

a.f) False

a.g) True

b.a) True

b.b) True

b.c) True

b.d) True

b.e) False

c.b) $\{ x \in N: x \text{ is a multiple of } 3\}$; infinite set

c.c) $\{ x \in Z: -4 < x < 10 \text{ and } x \text{ is odd}\}$ cardinality = $|7|$

c.d) $\{x \in N: -1 < x < 1001 \text{ and } x \text{ is a multiple of } 10\}$; cardinality = $|101|$

d.a) True

d.b) True

d.c) True

d.d) False

d.e) True

d.f) True

d.g) False

d.h) False

d.i) True

d.j) True

d.k) False

Question #8

3.2.4.b) P(A) = {Ø, {1}, {2}, {3}, {1, 2}, {1, 3}, {2, 3}, {1, 2, 3}}; False

1 Q7 19 / 25

- **0 pts** Correct
- **25 pts** No submission

3.1.1

- **1 pts** 3.1.1 a is True.
- **1 pts** 3.1.1 b is False.
- **1 pts** 3.1.1 c is True.
- **1 pts** 3.1.1 d is False.
- **1 pts** 3.1.1 e is True.
- **1 pts** 3.1.1 f is False.

✓ **- 1 pts** *3.1.1 g is False.*

- **7 pts** Missing

3.1.2

✓ **- 1 pts** *3.1.2 a is False.*

- **1 pts** 3.1.2 b is True.
- **1 pts** 3.1.2 c is True.
- **1 pts** 3.1.2 d is True.
- **1 pts** 3.1.2 e is False.
- **5 pts** Missing

3.1.5

- **1 pts** 3.1.5b

$$\{ x \in Z^+: x \text{ is an integer multiple of } 3 \}\\ \text{Infinite cardinality}$$

- **1 pts** 3.1.5d $$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}\\ \text{Cardinality} = 101$$
- **0.5 pts** Missing/incorrect cardinality for 3.1.5 b
- **0.5 pts** Missing/incorrect cardinality for 3.1.5 d
- **2 pts** Missing
- **0.5 pts** 3.1.5 b & d

Inconsistent use of $$N$$ (in B you assumed $$N$$ excludes 0 but in D you included 0 in $$N$$)

- **0.5 pts** 3.1.5 b

Incorrect use of $$Z$$ (recall that $$Z$$ includes 0 and other negative integers, which can also be multiples of 3). Use $$Z^+$$ instead.

- **0.5 pts** ``3.1.5 d

Did not exclude negative numbers for the set (recall that $$Z$$ includes non-positive numbers).

Correct ans: $$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}\\ \text{Cardinality} = 101$$

- **0.5 pts** 3.1.5 b

Did not use set builder notation / incorrect set builder notation

Correct ans:

$$\{ x \in Z^+: x \text{ is an integer multiple of } 3 \}$$

- **0.5 pts** 3.1.5 d

Did not use set builder notation / incorrect set builder notation

Correct ans:

$$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}$$

- **0.5 pts** 3.1.5 d

Did not include 0 (recall that $$Z^+$$ does not include 0). Use $$Z$$ instead

- **0.5 pts** 3.1.5 d

Did not exclude multiples of 10 that are larger than 1000. Correct ans:

$$\{ x \in Z: x \text{ is an integer multiple of } 10, 0 \leq x \leq 1000 \}$$

3.2.1

- **1 pts** 3.2.1 a is True.
- **1 pts** 3.2.1 b is True.

✓ **- 1 pts** *3.2.1 c is False.*

- **1 pts** 3.2.1 d is False.
- **1 pts** 3.2.1 e is True.
- **1 pts** 3.2.1 f is True.

✓ **- 1 pts** *3.2.1 g is True.*

- **1 pts** 3.2.1 h is False.

✓ **- 1 pts** *3.2.1 i is False.*

✓ **- 1 pts** *3.2.1 j is False.*

- **1 pts** 3.2.1 k is False.
- **11 pts** Missing

d.k) False

Question #8

3.2.4.b) P(A) = {Ø, {1}, {2}, {3}, {1, 2}, {1, 3}, {2, 3}, {1, 2, 3}}; False

2 Q8 **0 / 2**

- 0 pts Correct: $$\{\{2\},\{1,2\},\{2,3\},\{1,2,3\}\}$$

✓ **- 2 pts** *No submission / Incorrect*

- 1 pts Missed one element or parentheses issue

Question #9

a.c) $A \cap C = \{-3, 1, 17\}$

a.d) $A \cup (B \cap C) = \{-5, -3, 0, 1, 4, 17\}$

a.e) $A \cap B \cap C = \{1\}$

b.a) $\{x : x \in A_i \text{ for all } i \text{ such that } 2 <= i <= 5\}$

b.b) $\{x : x \in A_i \text{ for some } i \text{ such that } 2 <= i <= 5\}$

b.e) $\{x : x \in C_i \text{ for all } i \text{ such that } 1<= i <= 100\}$

b.f) $\{x : x \in C_i \text{ for some } i \text{ such that } 1<= i <= 100\}$

c.b) $\{x : x \in A \cup B\}$

c.d) $\{x : x \in A\} \cup \{x : x \in B\}$

3 Q9 5 / 9

- **0 pts** Correct
- **9 pts** No submission
- **1 pts** 3.3.1c $$\{-3, 1, 17\}$$
- **0.1 pts** 3.3.1c Missing element
- **1 pts** 3.3.1d $$\{-5, -3, 0, 1, 4, 17\}$$
- **0.1 pts** 3.3.1d missing/incorrect element
- **0.1 pts** 3.3.1d should be -3 not -2
- **1 pts** 3.3.1e $$\{1\}$$
- **1 pts** 3.3.3a $$\{1\}$$
- **0.1 pts** 3.3.3a missing brackets
- **1 pts** 3.3.3b $$\{1, 2, 3, 4, 5, 9, 16, 25\}$$
- **0.1 pts** 3.3.3b Missing/Incorrect Element

✓ **- 1 pts** *3.3.3e $$\{ x \in \mathbb R : -1/100 \leq x \leq 1/100\}$$*

- **0.1 pts** 3.3.3e Missing braces
- **0.1 pts** 3.3.3e should be - 1/100 not -100

✓ **- 1 pts** *3.3.3f $$\{ x \in \mathbb R : -1 \leq x \leq 1\}$$*

- **0.5 pts** 3.3.3e, f did not express set builder notation properly.
- **0.1 pts** 3.3.3f Missing Braces

✓ **- 1 pts** *3.3.4b $$\{ \varnothing, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}, \{a,c\}, \{a,b,c\}\}$$*

- **0.1 pts** 3.3.4b Should be {b, c} not {b,d}

✓ **- 1 pts** *3.3.4d $$\{ \varnothing, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}\}$$*

- **0.5 pts** 3.3.4b,d Missing null set in one or more questions or has an error with one element.
- **0.1 pts** Incorrect question but correct answer
- **0.1 pts** Incorrect way to write null set
- **0.1 pts** 3.3.1c Missing brackets
- **0.1 pts** 3.3.1e missing brackets

Question #10

a.b) {foam, tall, non-fat}

a.c) {{foam, non-fat}, {foam, whole}, {no-foam, non-fat}, {no-foam, whole}

b.b) True

b.c) True

b.e) False, A is a subset of B it is not equal to B

c.d) {{01}, {0011}}

c.e) {{aaa}, {aaaa}, {aba}, abaa}}

d.c) {(ab), (ac), (aa), (ab), (ad)}

d.f) {{λ}, {(ab)}, {(ac)}, {(ab), (ac)}}

d.g) {({λ}, {λ}), ({λ}, {b}), ({λ}, {c}), ({λ}, {bc}), ({a}, {λ}), ({a}, {b}), ({a}, {c}), ({a}, {bc})}

4 Q10 6 / 10

- **0 pts** Correct
- **10 pts** No submission

A

- **1 pts** 3.5.1 B

One possible answer: $$(\textrm{foam, tall, non-fat})$$

- **1 pts** 3.5.1 C

$$\{(\textrm{foam, non-fat}), (\textrm{foam, whole}), \\(\textrm{no-foam, non-fat}), (\textrm{no-foam, whole})\}$$

B

- **1 pts** 3.5.3 B

True. If $$(x, y) \in \mathbb Z^2$$, then $$x$$ and $$y$$ are integers. Every integer is also a real number, so $$(x, y) \in \mathbb R^2$$.

- **1 pts** 3.5.3 C

True. The elements in $$\mathbb Z^2$$ are pairs. The elements in $$\mathbb Z^3$$ are triples. Therefore the two sets have no elements in common.

✓ **- 1 pts** *3.5.3 E*

True. If $$(a, c) \in A \times C$$, then $$a \in A$$ and $$c \in C$$. Since $$A \subseteq B$$, then $$a \in B$$. Therefore $$(a, c) \in B \times C$$.

C

✓ **- 1 pts** *3.5.6 D*

$$\{01, 011, 001, 0011\}$$

- **1 pts** 3.5.6 E

$$\{aaa, aaaa, aba, abaa\}$$

D

✓ **- 1 pts** *3.5.7 C*

$$\{aa, ab, ac, ad\}$$

- **1 pts** 3.5.7 F

$$\{\varnothing, \{ab\}, \{ac\}, \{ab,ac\}\}$$

✓ **- 1 pts** *3.5.7 G*

$$\{(\varnothing, \varnothing), (\varnothing, \{b\}), (\varnothing, \{c\}), (\varnothing, \{b,c\}), \\(\{a\}, \varnothing), (\{a\}, \{b\}), (\{a\}, \{c\}), (\{a\}, \{b,c\})\}$$

1

{bc} is not the same as {b,c}

Question #11

a.b) Proof: True

(B ∪ A) ∩ (¬B ∪ A) = A	Complement Laws
(B ∨ A) ∧ (¬B ∨ A) = A	Intersection/Union Laws
(A) ∧ (A) = A ∩ A = A	Idempotent Laws

a.c) Proof: True

(¬A ∪ ¬¬B) = ¬A ∪ B	De Morgan's Laws
(¬A ∪ B) = ¬A ∪ B	Double Complement Law

b.b) Assume A = {1} and B = {1, 2, 3}

A - (B ∩ A) = {1} - {1} = {∅}
Since, A - (B ∩ A) = {1} - {1} = {∅} Therefore, A - (B ∩ A) != A

b.d) Assume A = {1} and B = {1, 2, 3}

(B - A) ∪ A = {2, 3} ∪ {1} = {1, 2, 3}
Since, (B - A) ∪ A = {1, 2, 3} Therefore (B - A) ∪ A != A

c.b) Proof: True

A ∩ (B ∩ ¬A)	Subtraction Law
(A ∩ B) ∩ (A ∩ ¬A)	Distributive Laws
A ∩ (∅) = ∅	Complement Law

c.c)

$A \cup (B \cap \neg A)$	Subtraction Law
$(A \cup B) \cap (A \cup \neg A)$	Distributive Laws
$(A \cup B) \cap (U)$	Complement Laws
$(A \cup B) \cap (U) = A \cup B$	The Union of A & B intersects with *U* (Universal set)

5 Q11 **3.5 / 6**

- 0 pts Correct

- 6 pts No submission

✓ **- 1 pts** *3.6.2b*

i. $$(B \cap B) \cup A$$ Distributive law

ii. $$\varnothing \cup A$$ Complement law

iii. $$A \cup \varnothing$$ Commutative law

iii. $$A$$ Identity law

- 1 pts 3.6.2c

i. De Morgan's Law

ii. Double Complement Law

- 1 pts 3.6.3b

If $$A = \{a, b\}$$, and $$B = \{a\}$$, then $$A - (B \cap A) = \{b\}$$, which is not equal to $$A$$.

- 1 pts 3.6.3d

If $$A = \{a\}$$, and $$B = \{b\}$$, then $$(B - A) \cup A = \{a,b\}$$, which is not equal to $$A$$.

✓ **- 1 pts** *3.6.4b*

i. Set Subtraction law

ii. Commutative Law

iii. Associative Law

iv. Complement Law

v. Commutative Law

vi. Domination Law

✓ **- 1 pts** *3.6.4c*

i. Set Subtraction law

ii. Distributive Law

iii. Complement Law

iv. Identity Law

- 6 pts Not submitted or incorrect

+ 0.5 *Point adjustment*

half point deducted from 3.6.4c

2 This is not one of the set identities from the table

3 please note that "empty set" and "{empty set}" are different.

4

Incorrect use of distributive law

5 This is Identity law

6 typed EC **5 / 0**

✓ **+ 5 pts** *entirely typed*

+ 0 pts not entirely typed

7 Tagging / Starting questions on new pages / Formatting equations **0 / 0**

✓ **- 0 pts** *Correct*

- 10 pts Untagged / Did not start questions on new pages / Too many unformatted equations