Problem set 5,6

Graded

Student

Total Points

98 / 100 pts

Question 1

Exercise 3.1.7d

4 / 4 pts

The rubric is hidden for this question.

Question 2

Exercise 3.1.10

4 / 4 pts

The rubric is hidden for this question.

Question 3

Exercise 3.1.12

4 / 4 pts

The rubric is hidden for this question.

Question 4

Exercise 3.1.16b

4 / 4 pts

The rubric is hidden for this question.

Question 5

Exercise 3.1.18c

4 / 4 pts

The rubric is hidden for this question.

Question 6

Exercise 3.1.18d

4 / 4 pts

The rubric is hidden for this question.

Question 7

Exercise 3.1.22b

4 / 4 pts

The rubric is hidden for this question.

Question 8

Exercise 3.1.23b **4** / 4 pts

The rubric is hidden for this question.

Question 9

Exercise 3.1.33c **4** / 4 pts

The rubric is hidden for this question.

Question 10

Exercise 3.1.33d **4** / 4 pts

The rubric is hidden for this question.

Question 11

Exercise 3.2.10 **4** / 4 pts

The rubric is hidden for this question.

Question 12

Exercise 3.2.15 **6** / 6 pts

12.1 **b** **2** / 2 pts

The rubric is hidden for this question.

12.2 **d** **2** / 2 pts

The rubric is hidden for this question.

12.3 **e** **2** / 2 pts

The rubric is hidden for this question.

Question 13

Exercise 3.2.19 **2** / 4 pts

The rubric is hidden for this question.

Question 14

Exercise 3.2.25b **4** / 4 pts

The rubric is hidden for this question.

Question 15

Exercise 3.2.42 **4** / 4 pts

The rubric is hidden for this question.

Question 16

Exercise 3.3.10 — **4** / 4 pts

16.1 **b** — **1** / 1 pt

The rubric is hidden for this question.

16.2 **d** — **1** / 1 pt

The rubric is hidden for this question.

16.3 **e** — **1** / 1 pt

The rubric is hidden for this question.

16.4 **f** — **1** / 1 pt

The rubric is hidden for this question.

Question 17

Exercise 3.3.21 — **6** / 6 pts

17.1 **c** — **2** / 2 pts

The rubric is hidden for this question.

17.2 **d** — **2** / 2 pts

The rubric is hidden for this question.

17.3 **e** — **2** / 2 pts

The rubric is hidden for this question.

Question 18

Exercise 3.3.35a — **4** / 4 pts

The rubric is hidden for this question.

Question 19

Exercise 3.3.35b — **4** / 4 pts

The rubric is hidden for this question.

Question 20

Exercise 3.3.36a — **5** / 5 pts

The rubric is hidden for this question.

Question 21

Exercise 3.3.36b

5 / 5 pts

The rubric is hidden for this question.

Question 22

Exercise 3.4.11

5 / 5 pts

The rubric is hidden for this question.

Question 23

Exercise 3.4.14

5 / 5 pts

The rubric is hidden for this question.

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My answers came in part or in full from the following sources

Put your answer in each indicated box. Answers must be handwritten, legible and use correct notation.
Be sure to study the answers in Appendix A to similar problems so you know what your approach should be.
Larger boxes indicate that you are expected to provide substantial detail.

1. Exercise 3.1.7d

$1 \leq x^2 \leq 4$

T is the truth set for $1 \leq x^2 \leq 4$

Let $T = \{-2, -1, 1, 2\}$

2. Exercise 3.1.10

let $a = 1$

$\frac{1-1}{1} = \frac{0}{1} = 0$

3. Exercise 3.1.12

let $x = 1$
let $y = 4$

$\sqrt{x+y}$
$\sqrt{1+4}$
$\sqrt{5}$

$\sqrt{x} + \sqrt{y}$
$\sqrt{1} + \sqrt{4}$
$1 + 2 = 3$

$3 \neq \sqrt{5}$
$\therefore \sqrt{x+y} \neq \sqrt{x} + \sqrt{y}$

4. Exercise 3.1.16b

$\forall x \in \mathbb{R}, (x > 0) \vee (x < 0) \vee (x = 0)$

5. Exercise 3.1.18c

$\forall s \in D, C(s) \rightarrow \sim E(s)$

6. Exercise 3.1.18d

$\exists s \in D \ni (M(s) \wedge C(s))$

7. Exercise 3.1.22b

$\forall a \in A,\ p \rightarrow P(x)$

A = valid arguments
p = true premises
$P(x)$ = "x has a true conclusion"

8. Exercise 3.1.23b

① $\forall x \in D,\ C(x) \rightarrow S(x)$
② $\forall a \in D,\ \sim C(a) \vee S(a)$

D = students
$C(x)$ = "x is a computer science student"
$S(x)$ = "x need to take data structures"

9. Exercise 3.1.33c

True

10. Exercise 3.1.33d

False

$a < c < b < d$
$a < b$ and $c < d$
counterexample

let $a = -1$ $b = 0$
$c = -2$ $d = 10$
$ac = 2$ $bd = 0$
$ac > bd$

11. Exercise 3.2.10

let $P = \{x \mid x$ is a computer program$\}$

$\sim(\forall x \in P,\ A(x) \rightarrow B(x)) \equiv \exists x \in P,\ A(x) \wedge \sim B(x)$

$A(x)$ = "x compiles without error messages"
$B(x)$ = "x is successful"

There exists a computer program P where P compiles without error messages and P is not successful

12. Exercise 3.2.15

(b)

True

(d)

True

(e)

False
Counterexample: 36

13. Exercise 3.2.19

$\exists n \in \mathbb{Z} \ni (A(n) \wedge B(n) \wedge C(n))$

let $A(n)$ = "n is not prime"
let $B(n)$ = "n is not odd"
let $C(n)$ = "$n \neq 2$"

14. Exercise 3.2.25b

Converse: If $2m$ is even, m is any odd integer

Counterexample: $m = 2$ $\quad$ 2 is even $\quad$ $2(2) = 4$

15. Exercise 3.2.42

If you obtained a master's degree, then you passed a comprehensive exam

16. Exercise 3.3.10 (answer T or F)

(b)	(d)	(e)	(f)
F	F	F	T

17. Exercise 3.3.21 (answer T or F)

(c)	(d)	(e)
1 is True 2 is False	1 is True 2 is True	1 is False 2 is False

18. Exercise 3.3.35a

Everybody trusts somebody $\quad$ Let $P = \{x \mid x \text{ is a person}\}$,
Let $T(x, y) =$ "x trusts y"

$\forall x \in P, \exists y \in P \ni T(x, y)$

19. Exercise 3.3.35b

$\sim(\forall x \in P, \exists y \in P \ni T(x,y))$ Let $P = \{x \mid x \text{ is a person}\}$
Let $T(x,y) =$ "x trusts y"

$\exists x \in P, \sim(\exists y \in P \ni T(x,y))$

$\exists x \in P \ni \forall y \in P, \sim T(x,y)$

20. Exercise 3.3.36a

Somebody trusts everybody Let $P = \{x \mid x \text{ is a person}\}$
Let $T(x,y) =$ "x trusts y"

$\exists x \in P \ni \forall y \in P, T(x,y)$

21. Exercise 3.3.36b

$\sim(\exists x \in P \ni \forall y \in P, T(x,y))$ Let $P = \{x \mid x \text{ is a person}\}$
Let $T(x,y) =$ "x trusts y"

$\forall x \in P, \sim(\forall y \in P, T(x,y))$

$\forall x \in P, \exists y \in P \ni \sim T(x,y)$

22. Exercise 3.4.11

The argument is invalid because of the converse error.

23. Exercise 3.4.14

The argument is invalid because of the inverse error.